No. 1884 Vol. XLVII FEBRUARY 1st, 1945

FLIGHT

and

AIRCRAFT ENGINEER

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8 MEN AND 2 DINGHIES

After a run-in with a flock of Junkers 88s, eight of the crew of a British-based U.S. Navy Liberator crashed into the winter sea, and were rescued 20 hours later by a British Air-Sea Rescue craft.

"We came down just as the light was failing, hit hard, and her nose went under water. I was stunned, and Lieutenant Lawrence Peterson dragged me out in time on to one of the two rubber dinghies.

"The next day a British air-plane found us and we were picked up by the rescue craft, 19 hours and 34 minutes after we crash-landed.

From the EVENING STANDARD.

The development and construction of the B.P.B. high Speed Rescue Launches is another of the achievements of

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FLIGHT
and
AIRCRAFT ENGINEER

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editor
C. M. POULSEN

Managing Editor
G. GEOFFREY SMITH, M.B.E.

War Correspondent
JOHN YOXALL

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The Outlook

The Ledo Road

THERE is a note of justifiable pride in the telegram which Admiral Mountbatten sent from Kandy, in Ceylon, to the Combined Chiefs of Staff, reporting that the first part of the orders he had received at Quebec had been carried out, and that the land route to China was now open. What this event will mean to the ill-equipped Chinese armies one can well imagine. What it has meant to the American troops who constructed it is less easy to picture. The curves and windings of the road shown on even the smallest sketch maps give some idea of what must have been an outstanding feat of military engineering.

For years past the only help which China has received from her Allies has gone by transport aircraft across "the Hump." The running of this airway was itself one of the prodigies of modern warfare, and it bodes well for the future of air transport when the guns have ceased to fire. It has been stated that a greater number of tons of goods was regularly sent by air than had been carried by the road from Lashio at its busiest time. But though the aggregate of tons in the aircraft exceeded that of the Burma road, the tonnage had to be made up of comparatively small articles. Artillery, lorries, and other heavy items could not be flown over "the Hump," and the Chinese had to manage as best they could without them. Now these items will be hurried through by road. Incidentally, Ledo is on the railway which connects northern Burma with India.

The air route is not to be closed down because the land route is now open. Its work is, in fact, to be expanded; for China still needs the things which have been sent by air, and the road is likely to be very full of traffic for some time to come. Once again the two elements co-operate, this time in supplying armies, as they have done in the West in fighting the enemy.

Widening the Base

FROM one point of view it might, of course, be argued that last week's debate on civil aviation at the Royal Aeronautical Society was somewhat futile in that the motion debated was whether or not surface transport interests should be permitted to participate in post-war development, the participation already being almost a *fait accompli* in that the railways are already operating air services, while many shipping companies have taken powers to include flying in their activities.

With that viewpoint we do not agree. The Government has not yet announced its policy, and it is all to the good that responsible sections of the community should first state their opinions. What may have been slightly surprising to some is that the meeting voted *for* participation by surface interests, the "division" showing 69 votes for and 47 against. It might have been expected that an aviation body such as the R.Ae.S. would have been in favour of retaining air transport for airmen. In this connection it would be well not to lose sight of the fact, pointed out by Dr. Roxbee Cox, that the meeting was far from being composed entirely of members of the society and that, in any case, those present were only a small fraction of the society's membership.

Anyway, if participation by surface interests is organised on the right lines, the advantages should outweigh the disadvantages. What must be prevented is any possibility of surface carriers obtaining control to the extent where they could, were they so minded, use their powers merely to hamper development. Mr. Rice, London representative of Pan American Airways, gave a very lucid explanation of the United States views (which prohibit surface transport operating air services), but while there is little doubt that they are good and

logical for America, it does not follow, as Mr. Rice was careful to point out, that the same considerations are applicable here.

"From This Moment Henceforth"

"THERE is no doubt that by this arrangement the Minister for Civil Aviation is completely in control of civil aviation matters from this moment henceforth." That is the sort of unequivocal statement for which the country has had to wait so long. It was made by Sir Stafford Cripps when he replied for the Government to the civil aviation debate in the Commons last week.

"This arrangement" was outlined by the Lord President of the Council, Mr. Attlee, in the following words: "Pending the passage of the necessary legislation, the powers necessary for the control of civil aviation and the B.O.A.C. will, *by a working arrangement*, be delegated by the Secretary of State for Air to the Minister for Civil Aviation, subject to a proviso that in matters affecting the conduct of the war the Secretary of State for Air will continue to have the right to give directions."

One point does not appear to have been made clear in the debate. The expression "civil aviation" was used repeatedly, but we have failed to discover in Hansard any statement by the Government spokesmen that the expression included the Department of Civil Aviation. Thus the relationship of Sir William Hildred and his department to Lord Swinton still remains something of a mystery.

Routes and Aircraft

SIR STAFFORD CRIPPS also had something to say of the Chicago Conference. Since this has been fairly fully dealt with in our columns already we need not repeat all here, but it was interesting to note that the Minister of Aircraft Production stressed, and very rightly so, the one very good thing that came out of Chicago so far as we are concerned: close collaboration of the Commonwealth countries. He recalled that at the London discussions which followed Chicago agreement was reached on (and these are his exact words): "how these routes should be put into operation as between the different countries, and particularly about the possibilities opened up by the cessation of the war." Sir Stafford mentioned the east-coast route to South Africa, the routes to India and via India to Australia and New Zealand, and the Pacific route via Canada and Fiji to Australia. Two omissions are here obvious. Sir Stafford did not mention that unless we get permission from the United States to use Hawaii the Pacific route will be something of a problem to operate; and he left out the route down along the West African coast.

Omission of any mention of the African west-coast route may be significant. Sir Stafford said that Lord Swinton does not regard any company or industry as having any vested interest in civil aviation, and that with him it is entirely a question of whether or not a real contribution can be made by railway and shipping companies towards the efficiency of our civil aviation transport services. We may be wrong, but we read into the omission of mention of the West African route an intention on the part of the Government to give shipping companies an interest in that route, and the air route across the South Atlantic to South America.

On the vexed question of civil aircraft we welcome Sir Stafford's assurance that the Minister for Civil Aviation will be in the same position as the Air Ministry and the Admiralty "just as if his were a third Service." That represents a great step forward, judging by instances of past discouragement that have come to our notice.

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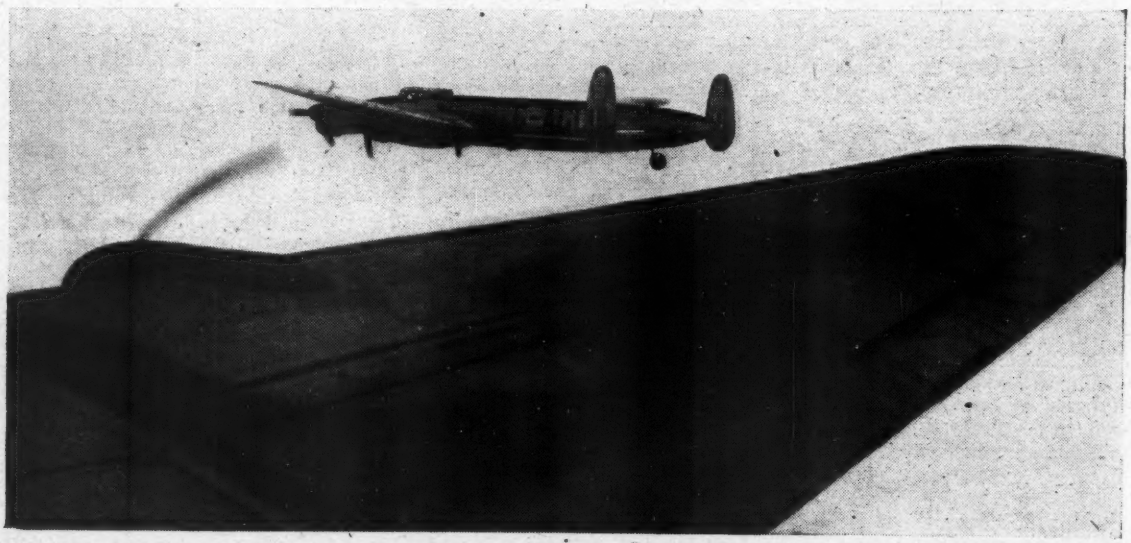


LANC. IN MUFTI. An Avro Lancastrian seen over the starboard wing of a Lancaster. With a maximum speed of 310 m.p.h., and a range of 4,000 miles, the Lancastrian has preserved all the excellent performance of its military predecessor the Lancaster.

A U.S. attack on the Japs in the Marshall Islands. Bettys in the rear centre are warming up to take off and a gutted Zeke is in the foreground. On the extreme right a bomb is skipping into a dispersal area.

WAR in the AIR

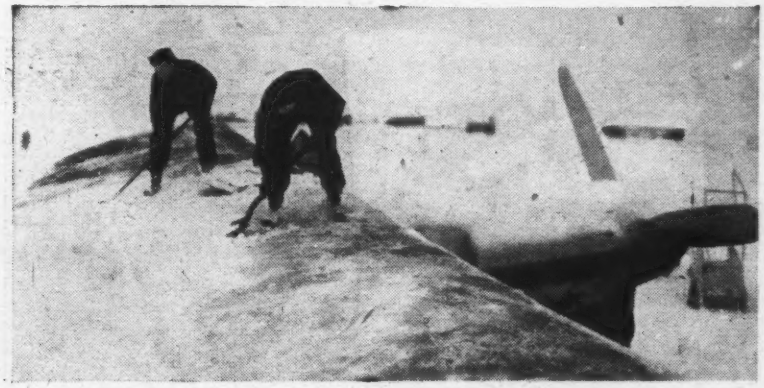
Pull-out from the Ardennes : Roads Blocked by T.A.F. : Russian Air Ascendancy in East Prussia : Luzon Airfield Captured

A LIVE question at the moment is whether Hitler has ordered Rundstedt to haul out all available armour, guns, lorries and troops from the Ardennes and despatch them to the East Front, where the Russians are rolling forward and threatening Königsberg, Danzig, Poznan, Breslau, and even Berlin itself, or whether Rundstedt is withdrawing from the Ardennes in order to strengthen his movement against Strasbourg. At any rate, the Germans in the Ardennes have not been standing on their order of going, but have been making all speed to clear out.

In weather which was not too bad for flying, this hurried retreat gave the Allied Tactical Air Forces another great opportunity. They swooped down on to the crowded roads, and wrought havoc. The German air cover was described as "hopelessly inadequate," yet the procession moved on by day as well as it could. In one day the Americans destroyed 978 transport vehicles and damaged over 900 others. Pilots noticed that German drivers left their seats and dived for cover under low-flying attacks, but came back determinedly to their seats and started up their vehicles, if possible, so soon as the immediate danger was past. Obviously they had strict orders to keep moving if they possibly could, and at all costs.

Squadrons which flew farther afield saw great numbers of fully-loaded trains, mostly running eastward and north-eastward from Dusseldorf. That, of course, suggested an attempt to reinforce the crumbling East Front, whatever the cost in the West might be. In one day the 2nd Tactical Air Force destroyed 18 locomotives and damaged 70 others, besides hitting at other targets. In the last war and in the early months of this one the Germans were able to move divisions to and fro as they liked between the East and West fronts, but now Allied air power makes such moves precarious and expensive.

Even so, the risk must be taken and the price paid. There is probably no fear that popular discontent will hurl Hitler from his throne; but he must pay *some* attention to the state of mind of the German people; and the advance of the Russians at such a great pace and on so wide a front has frightened the German population without any doubt. The broadcasters do not attempt to conceal the serious-



THIS ENGLAND : Shovelling snow and ice off the mainplane of a Lancaster at a Bomber Command station in England.

WAR IN THE AIR

ness of the situation, and hardly make any pretence of offering consolation or cheer. Even if Rundstedt were to recapture Strasbourg, that would do little to raise the spirits of the Germans in the East. At the same time, if troops are being moved in numbers from the West, the task of Eisenhower will be made easier.

The East Front

THE battle for Silesia was fought last week in a blizzard which made flying impossible. Although this deprives the Russians of a great advantage, they have been pushing on magnificently, and from various directions Berlin is threatened. The *Kölnische Zeitung* declared last week that the situation was very dark, and that every Berliner must ask whether the Russians could be stopped within the next few days. Actually the capture of the German capital would not necessarily end the war, though it would be a great triumph. Wars are not won by seizing cities, but by destroying the enemy's armed forces.

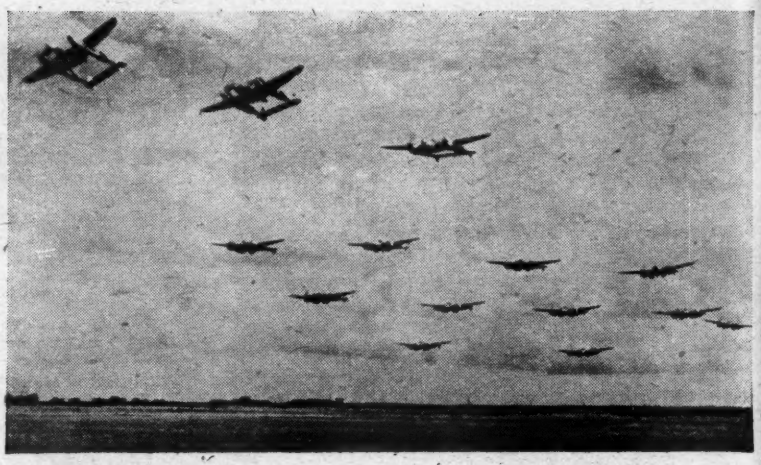
Memel, in Lithuania, has been occupied by the Russians; and this must be a particularly bitter blow to Hitler, as it was one of the places he seized before the invasion of Poland forced Britain and France to declare war. In those days it must have seemed to Hitler that no Power would venture to oppose his forward march.

Gen. Hammer has announced that the *Luftwaffe* has been massed in the East, and that may well be more or less correct. Certainly its aircraft have not been prominent of late in the West. The weather there has also been mainly against flying; but whenever there has been a fairer interval the British and American Tactical Air Forces have taken advantage of it, and have destroyed road transport and trains. The heavy bombers were grounded for nearly a week, but they were out again at the week-end. On Saturday night last Bomber Command went for railways and sent Mosquitos to Berlin. The U.S. Army 8th Air Force celebrated its third anniversary with attacks by 1,000 machines, with an escort of Mustangs, on railways and benzol plants. Air Chief Marshal Portal and Lieut. Gen. Doolittle exchanged cordial messages on the occasion of the anniversary.

Marshal von Rundstedt's offensive against Strasbourg and Alsace in general did not develop by the week-end into a major movement. The American 7th Army and the French seem to have the situation well in hand. On the other hand, our reconnaissance aircraft have observed the stream of troop trains and road vehicles still moving in great numbers off in the direction of the East. It is too early to say for certain, but the move against Alsace may have been a feint, intended to distract Allied attention from the Eastward movement. Perhaps Rundstedt thought that because the *Luftwaffe* now hardly ever sends a machine into the air, the Allied airmen would be equally earthbound. If so, he was mistaken. News of the German movements was duly reported to the Allies.

In Burma things seem to be working up for a big battle for Mandalay. The supply lines of the Allies are lengthening, and air transport can hardly supply all the columns with their innumerable needs. Again we repeat, we need to occupy Rangoon; and we feel sure that nobody is more anxious to do so than Admiral Mountbatten. However, we have a great ascendancy in the air, and in the last eight months our forces have seized no fewer than 38 airfields and strips. This was done methodically. First our own aircraft bombed them so persistently that the Japanese could not use them; and so the way was made easier for our ground troops to advance and occupy them.

In Luzon the Americans have occupied Clark airfield. Superfortresses from the Marianas have again bombed Tokyo, and also Saigon, in Indo-China. The formation which flew to Tokyo was met by the strongest opposition it had yet encountered, and the crews claimed 75 Japanese fighters as destroyed or damaged. This is probably a good sign. It shows that the Japanese feel the necessity of defending their capital; and that ties down a large number of fighters. The Superfortresses bombed through broken clouds, but believed that good results were obtained. At Saigon the enemy was taken by surprise and there was no opposition.

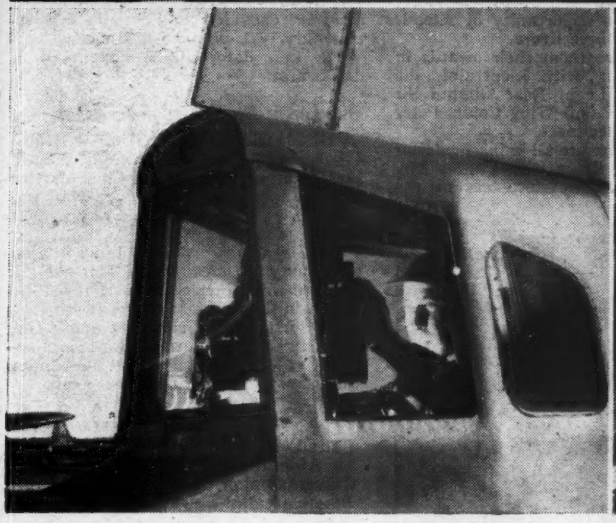


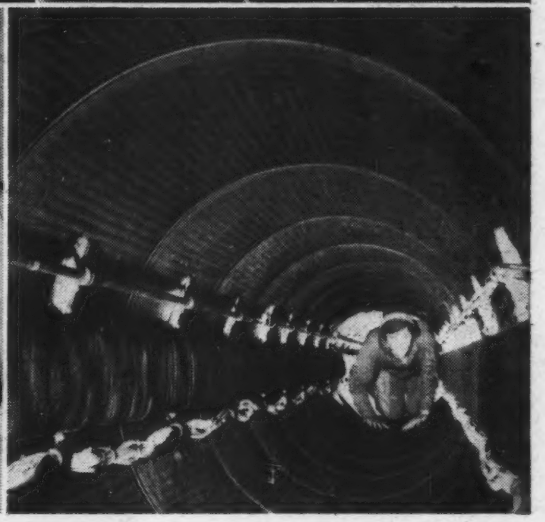
PROTECTING THE THUNDER : A formation of Lightnings returning to base in Italy after escorting U.S.A. 15th A.F. bombers on a raid in Austria.

FOR ARABIAN NIGHTS FLYING : Lt. Gen. D. I. Sultan, who commands the U.S. forces in India and Burma, in the cockpit of his personal aircraft.

BOEING SUPERFORTRESS

Some Exclusive Interior Photographs of America's Pressurised Bomber





THE accompanying photographs are the first detailed interior views of the Superfortress to be released by the U.S. authorities.

In the top left illustration can be seen the type of pressurised compartment where members of the relief crew on long missions can relax and rest on the bunks. It is interesting to note the thick quilting necessary for insulation against heat dissipation; it also acts as a deterrent to condensation of the moisture in the aircraft interior. How necessary this is will be evident when it is realised that at 35,000ft. the atmospheric temperature is about −66 deg. F., i.e., 92 deg. below freezing. On the wall behind the lower bunk can be seen the oxygen supply and metering equipment which is used when action is joined and the possibility exists that the cabin may be punctured. The crew compartment is situated aft of the gunners' stations, and in the top left corner of the picture can be seen a portion of the top rear turret; on the right is the pressure bulkhead and pressure-sealing circular door communicating with the unpressurised, 35ft. long tunnel leading to the tail gunner.

This tunnel is shown in the bottom right illustration, and evidences a remarkable cleanliness and absence of obstruction in the fuselage structure. Electrical wiring is made up in looms and is extremely accessible; the ducts on each side are, possibly, enclosures for control linkage runs.

Up in the extreme nose the bombardier sits in an effective attitude as shown at top right. In front of him and on his left is the computing gyro-bomb-sight with which he does the culminating task of his duty. The glass panels of the nose are said to be flak-proof, and, therefore, it is imagined, bullet-proof also.

At bottom left is shown the tail gunner's enclosure, and, inside it, the gunner fiddling with *his* computing gyro-sight. This instrument is used in conjunction with the remotely controlled tail guns which are mounted below and in front of his feet. Tail guns are fired and manipulated entirely by remote control.

External skin formation is interesting, and the rudder size is indicated by the scale of the servo-tab.

HERE AND THERE

A.V-M.'s Death in U.S.

AIR VICE-MARSHAL R. MANSELL, a member of the British Commission in America, has died in Washington after a heart attack. He was Controller of the Technical Services.

DH Down Under

MOSQUITOES built in the de Havilland factories in Australia, it is now officially stated, have been in action against the Japs since last August. The first operational flights were made from Darwin.

Telling the Chinese

AN exhibition of photographs giving a vivid picture of British air power opened in Chungking recently. It was organised by the Press Office of the British Embassy, and is drawing large crowds of Chinese.

I.C.E.'s New Division

THE council of the Institution of Civil Engineers has decided to form an Air Transport Division. This will be the institution's sixth engineering division, and it will deal with airfields, operational facilities and buildings, and safety appliances.

Sir Frank Spriggs

HIS many friends will be sorry to learn that Sir Frank Spriggs, managing director of the Hawker Siddeley Aircraft Co., Ltd., has had to go into hospital for an operation. It is hoped, however, that his stay will be of relatively short duration, and he is expected to be back in business in a couple of weeks.

Visited 2nd T.A.F.

COMMANDER R. A. BRABNER, Parliamentary Under-Secretary of State for Air, recently paid a visit to a 2nd T.A.F. base on the Western Front and showed particular interest in operational and intelligence centres where attacks on the V2 launching sites in Holland are planned.

The B-19

USED as a "flying laboratory" since it was taken over by the U.S.A.A.F. at Wright Field, the giant Douglas B-19 has now been re-powered with four of the new 24-cylinder Allison "W" engines, each developing 2,600 h.p., thus increasing available power by some 30 per cent.

Turbo-superchargers for high-altitude performance, and reversible-pitch airscrews for reducing the landing run, are fitted, but it is not thought that any more B-19 aircraft will be built.

REFLECTED INFLEXIONS: German *Luftwaffe* girls, to be used on the wireless, practising elocution before a mirror. Maybe they're learning Russian!

Special Investiture

EIGHT Australian airmen had a special investiture all to themselves at Buckingham Palace last week. They were a group of officers on their way back to Australia, who would, therefore, not have had an opportunity of attending an ordinary investiture.

The King gave them their awards in the Bow Saloon, with Lieut.-Col. the Hon. Sir Piers Legh, Rear-Admiral Sir Arthur Bromley, and Wing Cmdr. Peter Townsend in attendance.

The eight pilots are all going home for transfer to civil flying with Qantas Airways, and all flew Lancasters in the R.A.A.F. with the exception of one, who was a Halifax pilot.

YANKS, FOR THE USE OF: The new British gyroscopic gunsight (previously described in *Flight*) is now being used by U.S. fighter pilots. The American model, as seen in a Mustang, differs slightly in detail from the R.A.F. type.

Debate Postponed

THE Royal Aeronautical Society announces that the debate on civil aviation scheduled for February 8th has unavoidably had to be postponed.

The new date will be announced in due course.

Leigh-Mallory's Successor

AIR MARSHAL SIR GUY GARROD is now Allied Air C.-in-C. South-East Asia. He succeeds Air Chief Marshal Sir Trafford Leigh-Mallory, who was killed in an air crash on his way to take up the post.

Sir Guy Garrod went to India in 1943 as deputy to Air Chief Marshal Sir Richard E. C. Peirse, who was the Allied Air C.-in-C. until last year.

The first official indication of Sir Guy Garrod's new appointment was contained in the order of the day issued by Admiral Lord Louis Mountbatten last week.

In the Trade

REDWING, LTD. (formerly Redwing Aircraft Co., Ltd.), Croydon and Wolverhampton, has acquired the issued share capital of Fairfield Aviation, Ltd., Watford.

British Exhibition in Turkey

AN exhibition on Britain's war effort has been opened at the Halkevi (the people's meeting house) in Ankara, after a pre-view attended by M. Chukru Sarajoglu, the Turkish Prime Minister, and M. Hasan Saka, Foreign Minister.

The show was organised by the Press Office of the British Embassy.

Pilots' Post-war Pool

THE Brevet Flying Club has been registered as a limited company with the object of creating a pilots' pool for post-war purposes, etc., stated Jordan's Register of Companies recently.

The nominal capital is £10,000, and the directors are C. E. Refitt, Wing.

HERE AND THERE

Cdr. Douglas Haig, P. E. Refitt and Sqn. Ldr. R. Shillcock.

Firemen's V1 Exhibition

MORE than 250,000 people have visited the official exhibition of actual V1 parts, arranged by the National Fire Service, in Leicester Square, since it opened early in December.

B.I. Staff Appointments

BRITISH INSULATED CABLES, LTD., announce that Mr. N. K. Bunn (works manager) and Mr. J. L. Harvey (production manager) are now appointed joint general works managers. Mr. W. J. Clements is appointed works manager, Prescot works.

U.S. Terminal Traffic

LA GUARDIA airfield is reported to be dealing with the arrival and departure of between 20 and 30 trans-atlantic aircraft daily, in addition to some 200 domestic aircraft.

Just before America was brought into the war, this airfield recorded its "peacetime" traffic peak with 248 flights recorded.

Long-range "Recce"

THE longest photographic reconnaissance flight so far made in South-east Asia—a flight of 2,350 miles—was made recently by a P.R. Mosquito from an Arakan base.

"We were airborne for 8 hr. 20 min.," said the pilot, Wing Cdr. Michael Lowry, "and but for a head wind would have covered a greater distance."

Per Underground ad Astra

A CITY reader sends us the following conversational gem:—

Overheard on the Southern Railway one morning:—

1st Man: "Ever hear from —— these days?"

2nd ditto: "No."

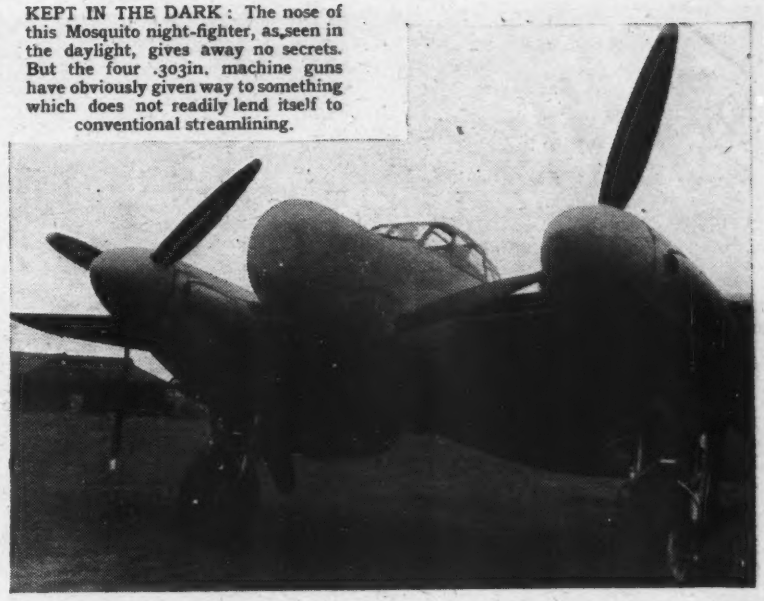
1st ditto: "Big Bug on the Underground, you know—used to fly everywhere—Paris one day . . . etc., etc."

Tedder's Pipe

AIR CHIEF MARSHAL SIR ARTHUR TEDDER, Deputy Supreme Commander, A.E.F., seldom pictured without a pipe, now possesses two of Australian manufacture. They were the Christmas gift of Mr. James Altson, a Melbourne tobacconist, who sent a covering message through the A.O.C. R.A.A.F. O.H.Q. (Air Vice-Marshal H. N. Wrigley).

"The parachute didn't open so I came back."

KEPT IN THE DARK: The nose of this Mosquito night-fighter, as seen in the daylight, gives away no secrets. But the four .303in. machine guns have obviously given way to something which does not readily lend itself to conventional streamlining.



French Air Ace

LT. COL. POUYADE, commander of the French "Normandie" Air Squadron which is serving on the Russian front, recently returned to Paris.

He was accompanied by Lt. Marcel Albert, was warmly welcomed by a large crowd at the railway station, and was later officially received by M. Charles Tillon, the French Minister for Air.

R.A.A.F. Expansion

MR. ARTHUR DRAKEFORD, the Australian Air Minister, stated recently that the R.A.A.F. is now forty times stronger than it was in 1939, with 42,600 personnel trained or still in training under the Empire scheme.

"The Australian W.A.A.F.," he added, "has now 18,543 members, the Air Observer Corps 20,276, and the Cadet Corps 11,248 members."

Expensive Curiosity

FOR trying to get information in the West Riding of Yorkshire about the building of a jet-propelled unit, two Wolverhampton men, Stewart Ripon and William Pashley Alexander, were each fined £50 and ordered to pay £1 2s. 6d. costs at Wolverhampton magistrates' court recently.

Mr. E. G. Robey, who appeared for the Director of Public Prosecutions, said there was no suggestion of any sinister motive. Evidence was taken in camera.

Retired

GROUP CAPT. E. R. C. HANSON, having passed the age for retirement, has left the Air Ministry after twelve years' service in a civilian capacity as Inspector of Recruiting for the R.A.F.

He served in the R.N.A.S. during the last war, and was commissioned in the R.A.F. in 1919. He was engaged in air staff and other duties at home and overseas until 1932, when he retired at his own request at the age of 49, and received the appointment which he has just relinquished at the age of 62.

New Belfast Club

EXTENSIVE premises were opened in Belfast on Monday, January 15, by the Aeronautical Engineers' Club, a subsidiary of the Aeronautical Engineers' Association.

The club rooms consist of a large billiards room with four full-size tables, card rooms, table tennis rooms and refreshment rooms. There is also office accommodation for the local branch committees, and a general meeting hall where future gatherings of the association will be held.

The club, situated at the corner of Ormeau Road and Howard Street South, is very convenient to the centre of the city and should prove a great attraction to aeronautical engineers resident in or visiting Belfast.

Memorial to John Flynn

THE name of the Rev. Dr. John Flynn, O.B.E., is nothing like as well known, outside Australia, as it deserves to be.

For it was his vision, backed by untiring efforts which refused to be daunted by lack of encouragement and endless setbacks, that led to the formation of the Flying Doctor Service which, harnessing medicine, radio and aviation, secures the physical welfare of isolated settlers and aboriginals in the "outback" of that vast continent.

At the 1944 meeting of the Federal Council of the F.D.S., it was decided (on the recommendation of the Queensland section) to establish a fund to perpetuate the name of Dr. John Flynn and to erect a suitable memorial to him at the junction of the north-south and east-west highways in the northern territory.

Such a man is worth remembering.

D

The LANCASTRIAN

THERE is a big lesson to be learnt from the Avro Lancastrian, and that is that each aircraft must be designed for the specific purpose for which it is intended. As a bomber the Lancaster is a world beater. It ploughs its quick way to Berlin with a load of bombs weighing 14,000 lb. The same aircraft (except for a pointed nose and tail) as a nine-seater airliner carries less than half that load.

A glance at the official weight figures on page 120 shows a maximum payload of only 4,845 lb. for an all-up weight of 65,000 lb. These are somewhat pessimistic figures because 68,000 lb. is quite an ordinary take-off weight and there is no reason why a maximum of even 72,000 lb. should not be allowed. The difficulty, of course, lies in the fact that the Lancaster was designed for very concentrated and dense loads and, although many more passengers could be carried, there is nowhere to park them.

As Sir Roy Dobson, managing director of the Avro concern, has said, "The Lancastrian is not to be taken for something which it is not. It is the outcome of an urgent request for aircraft suitable for flying V.I.P.s (Very Important Personages) long distances at high speed and regardless of cost. The necessary changes in design were made two and a half years ago. The real Avro commercial aircraft will be seen this summer when the Avro 20 (Tudor I) and Avro 21 (Tudor II) will be flown. They will have accommodation for a maximum of 68 passengers with a range of 4,000 miles."

For Empire Routes

Bearing the foregoing in mind, it can be said with truth that the Lancastrian is a first-class, if uneconomical, aircraft. The machines which are now being built in this country are for use on the Empire routes—particularly the Britain-Australia run—by the British Overseas Airways Corporation to supplement the purely transport types such as the Avro York. Earlier models, built in Canada, have for a long time been in service with Trans-Canada Air Lines, Ltd. They have also been operating a regular thrice-weekly service across the North Atlantic ocean between Montreal and Prestwick, in Scotland. The best figures which have been set up in these crossings are:—westbound, 11 hr. 26 min., and eastbound, 10 hr. 13 min. These speeds have, of course, been excelled by purely military types, but there is no other civil aircraft of equivalent weight with a superior performance.

In the main structure the Lancastrian is identical with the Lancaster, but all the bomber's carrying capacity has been con-

COLD CONFERENCE: (L. to R.) H. A. Browne (chief test pilot); Sir Roy H. Dobson (managing director); Roy Chadwick (chief designer) and C. E. Fielding (director of works production).

IN PEACEFUL GUISE: The absence of paint and the pointed nose effectually camouflages the original outline of the Lancaster.

Converted Bombers for B.O.A.C.: Stop-gaps Until Other Aircraft are Ready: Long Range and High Speed

(*Above*) Capt. J. H. Orrell, one of the Avro test pilots, at the controls of the Lancastrian. (*Right*) Three settees in a row with their backs to the port fuselage-wall provide accommodation for nine persons. Three of the beds, six of which can be provided, fold down from the roof.

verted as conveniently as possible to civil needs. The front and tail ends of the fuselage have had the gun turrets removed and pointed, streamlined cowlings substituted.

Starting from the tail end, the layout of the fuselage is as follows:—Right aft is a baggage compartment of 41 cu. ft. capacity, and this adjoins the passengers' toilet, which has 93 cu. ft. of space. In addition to the usual lavatory and washing arrangements there is an electric razor. The main cabin takes up the remainder of the fuselage up to where the end of the cut-down bomb-bay begins. Nine seats of ample width, in the form of three settees, are placed with their backs to the port wall, and a row of square portholes on the starboard side gives plenty of light. The passengers cannot, however, look out of the windows in a downward direction without rising from their seats. These three settees are convertible into three bunks for sleeping passengers, and a further three sleeping bunks, making six in all, hinge down from the ceiling. The passengers' quarters in all total 570 cu. ft.

Steward's Galley

Adjoining the main cabin is a small galley for the steward with the usual cupboard equipment, hot and cold water and sink. To enable cool drinks and food to be served in the tropics, a refrigerator is also fitted. The door between the galley and the main cabin is very narrow, and stewards will have to be specially selected for their slimness and agility.

The crews' quarters and lavatory arrangements are between the wing spars, and immediately in front of the

THE LANCASTRIAN

PERFORMANCE		
Speeds a mean weight of 53,000 lb.	ft.	(m.p.h.)
All-out level in medium supercharge at	3,500	295
" " " full " "	12,000	310
Max. weak-mixture cruising in medium supercharge at	11,000	275
Max. weak-mixture cruising in full supercharge at	17,500	285
Rates of climb at 65 000 lb.	ft.	(ft./min.)
In medium supercharge at sea level	—	750
" " "	9,500	750
" full "	16,000	550
Service ceiling	23,000	—
Take-off (still air) at 65,000 lb. weight		(yards)
Ground run		800
From rest to clear 50ft. screen		1,200
Range (still-air conditions)		(miles)
With 3,174 galls. of fuel and carrying 3,597 lb. payload at 15,000ft.		
At most economical speed (average 200 m.p.h.) and average fuel consumption of 152 gals./hr.		4,150
At speed between most economical and maximum weak-mixture cruising speed (average speed 232 m.p.h., average consumption 186 gals./hr.)		3,950
At max. weak-mixture cruising speed (average 265 m.p.h.) and average fuel consumption 236 gals./hr.		3,570

DIMENSIONS			
Length overall 76ft. 10in.	Wing Span	102ft. 0in.	
Height overall 19ft. 6in.	Wing Area (gross)	1,297 sq. ft.	

WEIGHT DATA	
Empty Weight	30,426 lb.
Fixed and removable equipment, including: Electrical, instruments, auto-controls, radio de-icing, dinghies, heating and ventilation and oxygen	4,160 lb.
Weight equipped, but less furnishings	34,586 lb.
Furnishings including: Bunks, mattresses, settees, toilets, upholstery, carpets, soundproofing, kitchen, food and water (bedding at 20 lb. per passenger not included)	1,564 lb.
Weight Equipped and Furnished	36,150 lb.
Fuel in wing tanks (2,154 galls.) (max.)	15,509 lb.
Fuel in fuselage tanks (1,020 galls.) "	7,344 lb.
Oil (150 galls.) (max.)	1,350 lb.
Crew (5 at 170 lb. each)	850 lb.
Crews' baggage at 40 lb. each	200 lb.
Passengers (9 at 170 lb. each)	1,530 lb.
Passengers' baggage at 55 lb. each	495 lb.
Mail or freight	1,572 lb.
Gross weight	65,000 lb.
Total Payload, i.e. Passengers + Passengers' baggage + Cargo =	3,597 lb.
Maximum Payload with corresponding reduction in fuel (about 175 galls.)	4,845 lb.
Wing Loading	50.10 lb./sq. ft.

The entrance to the main baggage compartment is through the detachable nose.

main spar on the starboard side are the radio operator's station and the navigator's chart table and instrument panel. First and second pilot sit side by side. Elevator and aileron controls are on a large-diameter tube which stretches across both positions, and the rudder pedals for the second pilot hang in space from behind the instrument panel. Beneath the flight-deck floor there is a small baggage compartment of 63 cu. ft., and in the position occupied by the bomb-aimer in the Lancaster, there is the main baggage room of 228 cu. ft. capacity.

Apart from the small baggage compartment under the pilots' floor the remainder of the bomb-bay is filled with long-range fuel tanks. There is this difference, however, that some 10ft. of the rear portion of the bomb-bay has been cut away to provide a level floor to the main cabin.

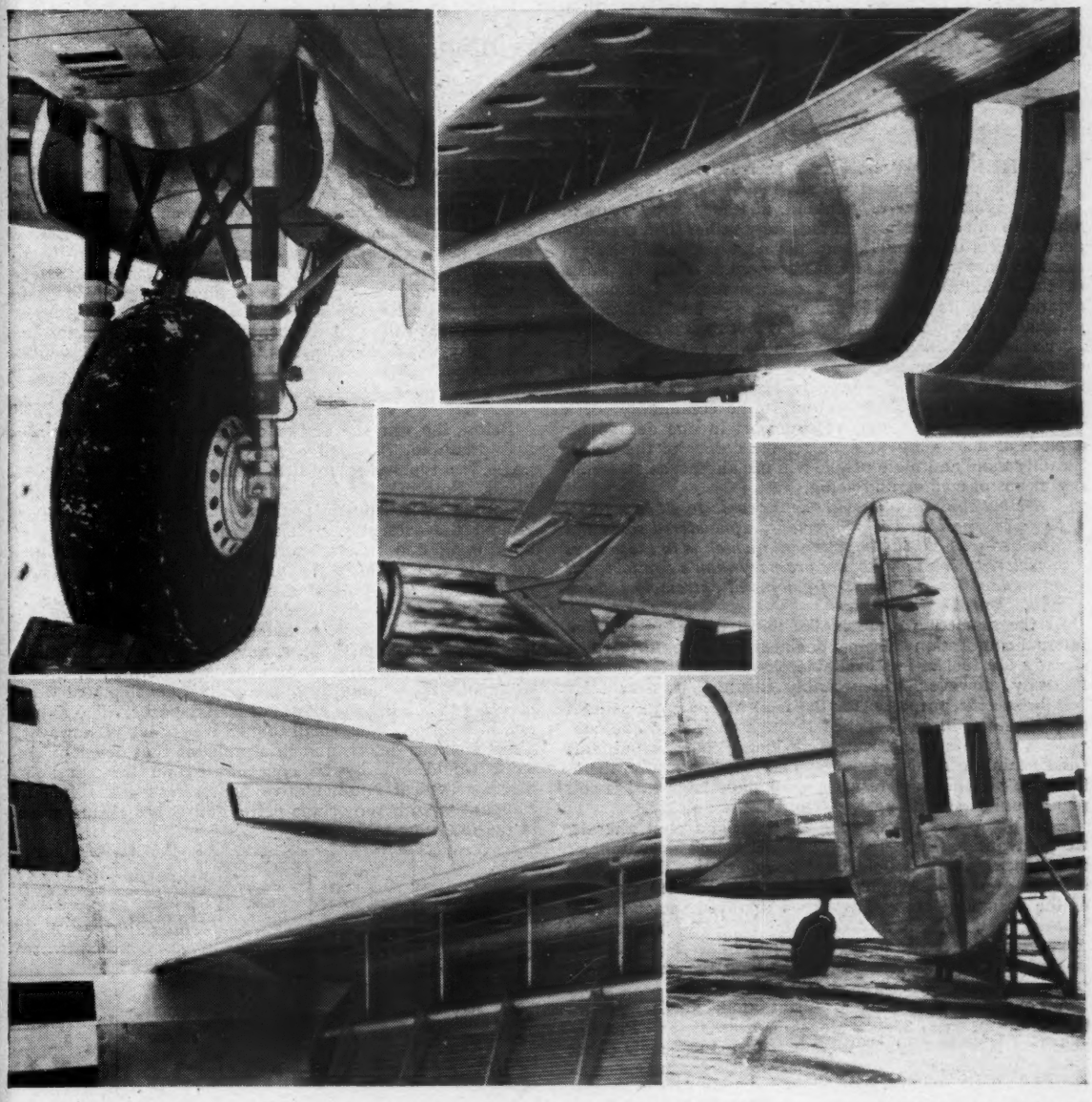
The normal crew of the Lancastrian is five; two pilots, navigator, radio operator and a steward. All the latest navigation equipment and radio aids are carried, and the wings and tail surfaces have full Goodrich de-icer gear.

In the Air

As a flying machine, the Lancastrian preserves all the qualities and charm of the Lancaster. On a test flight we flew with Capt. J. H. Orrell, one of the Avo test pilots. On the snow-covered airfield we taxied down to the end of the runway with a full complement of passengers on board warming the four Rolls-Royce Merlins as we went, at 1,000 r.p.m. Turning on to the main runway, the engines were run up, first the two outers and then the inboard ones. After a final look round to see all was O.K., Capt. Orrell put on 25 deg. of flaps and opened the throttles wide for the take-off. With 3,000 r.p.m. showing on the rev. counters, the acceleration was terrific, and in less than 12 seconds the pilot signalled to the engineer standing behind us to lift the undercarriage.

As soon as a comfortable height was reached, the airscrew control was put down until the Merlins were showing 2,000 r.p.m. in coarse pitch. At this we were cruising along at 160 m.p.h., but this did not represent a true cruising speed as we were dawdling about waiting for another aircraft to catch us up. The pilots' cockpit is very warm and does not suffer from draughts and, since it is well ahead of the airscrews, the noise is not excessive. Capt.

THE LANCASTRIAN



(*Top left*) The simple and sturdy undercarriage of the Lancastrian. (*Top right*) How the streamline tail of the engine fairing hinges when the flaps are operated. (*Centre*) The trimming tabs on the fabric-covered elevators are mass balanced. (*Bottom left*) The cabin-heater on the starboard side of the fuselage. The flaps below it are shown in the maximum down position of 57 degrees. (*Bottom right*) The Lancastrian is not painted and the make-up of the fin and rudder can be easily followed.

Orrell was wearing Mallock Armstrong ear defenders and, while this is a good standard practice for all test pilots, it is quite unnecessary in the Lancastrian.

From a gentle shoot-up of the airfield, the pull-out showed 4,000 ft. per min. on the rate of climb indicator as we rose in a climbing turn. In a maximum climb with the Rolls-Royce Merlins at 2,900 r.p.m. the rate of climb indicator showed 2,000ft. per min. at 4,000 ft. Had we been carrying full load, the figure would have been slightly less than this.

Next, we did a complete rate three turn—much to the consternation of the human freight we had on board—the 30-second circuit apparently having a very small radius. This ability to manœuvre may come in very handy when flying in areas where enemy fighters are likely to be met, but if it is practised on ordinary passengers, there is likely to be a complaint.

Next in order the ailerons were tested. The pilot alternately put them over to port and starboard, letting go of the wheel in the maximum position Each time they self-centred immediately. There is absolutely no backlash in the Lancastrian's controls.

Our flying finished, the undercarriage was selected down and the wheels were in the fully locked position in some twenty seconds. The flaps were lowered to their maximum lift position of 57 deg. and, as they went down, the attitude of the aircraft could be felt to change. Approaching at 110 m.p.h., there was a lovely feeling of confidence as the pilot remarked, "You can do as you like in the landing."

Safety Fuels

Their Relation to Engine Development and Their Future in Civil Aviation

By C. D. SOLTZ

WHEN the last shots have been fired in this war, it is probable that we shall have, taking the most cynical view of mankind, at least twenty years in which we can concentrate on the safety rather than performance aspects of flying (before the next political upheaval disrupts once more the normal economics of life!) Some of the grandiloquent plans for international commercial aviation and its natural ancillary, feeder-line traffic, will gradually emerge and become fact rather than fancy. Transport aviation is likely to come into its own throughout the countries of the world on something approaching a commercial basis; not, as before, merely as a means of transport for a small wealthy section of the community, or a very costly but sole form of transport in one decade for a piece of machinery to some remote corner of the globe. Steadily more and more people will use aircraft as an ordinary means of coming and going.

Are we going to allow all these people to sit in a fool's paradise, ensconced in comfortably upholstered seats and provided with all the impedimenta which is in these days considered necessary for the ordinary man's comfort, yet surrounded by thousands of gallons of extremely inflammable petrol?

At the moment we are in the midst of seeing the first internal-combustion turbine engines take the air, which already use fuel of less excitable characteristics. Practical necessity, however, will probably ensure that, except for certain specific purposes, for the next fifteen years at least civil aircraft will be propelled through the air by the conventional type of reciprocating engine. Feeder-line aircraft will certainly use this type of engine. For the future, therefore, the possibility of using a less inflammable fuel is still remote unless something is done about it quickly.

Even if no fire precautions are taken on civil aircraft, their advantages as a mode of travel would in a number of instances induce quite enough people to buy their tickets in spite of the occasional accident in which the majority of the occupants could have been removed intact if they had not been burnt to a cinder. It is the duty, however, of some governing body to limit passenger-carrying activities in favour of safety at some point along the development curve, and now is the time to do so.

A conscience is an inconvenient affair at the best of times, but an economic conscience is a necessity. Presumably that is why, through the minds of many people either interested or directly connected with the management of aviation affairs, there have always passed a few hesitating thoughts in connection with the fire risks in the inevitable accident.

Diesel Engines

For years many people have tried to argue a case for the Diesel engine, and apart from its theoretical or mechanical advantages and disadvantages, particular stress has always been laid on the reduction of fire risks which the use of a fuel of low volatility and high flash point would bring. For a number of reasons, but mainly due to the inherent nature of the beast, the aircraft has up to now had to have the most efficient all-round power plant the industry could produce, and the rapid developments in fuel technology, resulting in the production of 100 octane fuel in commercial quantities, have reduced the debatable advantages of the Diesel cycle to the point where, except for the Germans, no one would risk its development in aviation form. This is still true, and although a good case could even now be put up for the Diesel engine, the enormous amount of development work which would be entailed before it could start to approach the performance of the petrol aircraft engine is apt to dull the enthusiasm of even its most fervent supporters. So that interest in the Diesel engine has died, and there appears to be slowly rising to the surface a genial interest in what are termed "Safety Fuels," usually associated with such remarks as "How safe are Safety Fuels?" These diffident expressions of interest are excellent salves to the conscience, and so long as the dose is repeated fairly often the whole affair is thus indefinitely postponed.

Pre-war Experiments

Before the war one of two of the major fuel companies had produced, in small quantities for experimental purposes, two types of safety fuel, an aromatic and a paraffinic blend. Both of these fuels, with a tetra-ethyl lead addition of 5 mls. per Imperial gallon, gave anti-knock values around the present performance of 100 octane petrol at both weak and rich mixture strengths. Potentially the aromatic fuel gave greater anti-knock performance under rich-mixture strengths, but its calorific value and lead response were inferior. The latter is not particularly important because the engine manufacturers will be well advised not to tolerate, after the war, any increase in T.E.L. addition in order to improve anti-knock performance, owing to the inordinate quantity of component development work required to combat the effects of lead deposits. The reduction in calorific value, small though it may be, is, however, a more serious defect, and it is probable that development work would initially be concentrated on the paraffinic blend. Typical representative figures for such a fuel in comparison with 100 octane petrol and Diesel oil are given in the following table:—

Fuel Type	Initial and Final Boiling Point. Deg. C.	Flash Point. Deg. C.	Approximate Spontaneous Ignition Temperature Deg. C.	Approx. T.E.L. Concentration Per Imperial Gallon (mls.)
100 Octane Conventional Aviation Petrol ...	40–180	−30	450–500	5
Safety Fuel (of same anti-knock performance) ...	150–220	+45	450–500	5
Diesel Oil... ...	190–360	+80	300	Nil

It must be borne in mind that these figures, with the exception of the lead addition, depend very largely on the conditions and laboratory apparatus used; they are not an accurate measure of the particular liquid's performance under the conditions in which we are interested. They do, however, provide a guide, and the relative differences are probably maintained for all practical purposes.

Well, "How Safe is Safety Fuel?" Like Pontius Pilate, who also asked an inconvenient question, nobody will ever know unless an extremely expensive and rigorous series of full-scale experiments are carried out in time. The point is, does it matter? when it is reasonable to assume that the potential inflammability of an aircraft which, say, force-lands heavily with undercarriage retracted or merely lands heavily with undercarriage temporarily down, is considerably less with safety fuel in its tanks than one with conventional petrol.

It is also reasonable to suppose that, should fire occur, maybe initiated by the lubricating oil, its spread will be

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SAFETY FUELS

very much less rapid and intense, because the whole area of the crash will not be immediately permeated with highly inflammable vapour. The time to pull the unfortunate occupants to safety, or in the less severe crashes for the occupants to get themselves out, is, therefore, correspondingly increased. As Mr. Chubb said: "No safe is 100 per cent., but some safes take longer to open than others." The reasonable man should, therefore, be convinced without any practical demonstration that the fire risks after a partially controlled impact landing are less with safety fuel.

The fuel companies are usually fairly accommodating people if a sufficiently good case is proposed, and the introduction of such a fuel would probably involve no insuperable technical difficulties. Initially the price would almost certainly be higher, not because the ingredients are necessarily more expensive, but mainly because the initial tonnage required would be much lower and the conversion of existing plants a costly matter.

The use of safety fuel will entail certain engine alterations, the most important being the necessity of direct injection, as the volatility characteristics of such fuels will not allow them to be carburetted satisfactorily. Alternative means for cold-starting might also be found necessary.

German Experience

It is improbable that the majority of engine manufacturers will have any serious objections to the use of direct injection; in fact, it is already regarded as a further refinement of the piston engine. Technically it presents no special difficulties, particularly in view of the vast experience which the Germans must have built up, some of which should be at our disposal at the conclusion of the war. Its use has many advantages in respect of ensuring more even distribution, since accurate metering of the fuel is provided by the pumps, and the metering of air quantities is a much simpler problem than petrol/air mixtures. Icing risks are also further reduced in comparison with carburettors. The disadvantages mainly lie with the increase in mechanical complexity due to the greater number of moving parts, and the fact that the latent heat of vaporisation of the fuel is not utilised to increase the density of the ingoing charge. On balance direct injection probably wins, and the engine manufacturer needs little convincing; in fact he has probably already done a lot of development work for future power plants which in many cases will have more cylinders and consequently increased distribution problems.

It might be argued that although the fire risks in minor crashes are reduced, the fire risks in the air are increased due to the introduction, necessitated by direct injection, of a considerable number of extra-small-bore pipes subjected to fairly high internal pressures, with a consequent potential increase in areas for leak. This may be true, but methods have been developed for combating fire in the air, and a comparatively well-sealed nacelle containing apparatus for flame detection, flame-proofing of essential services and spray rings for distribution of extinguishing fluid, can cope with any sort of fire which might develop. Such an installation will be made compulsory for the civil aircraft of the future anyhow, so, although the requirements might need further consideration, they present no problems which cannot be satisfactorily tackled.

Time Required

Assuming the word "go" were to be given to-day, a reasonable estimate of the time required for the engine manufacturer to convert existing and prototype engines to operate on safety fuel would probably be three years. This time also would allow the fuel companies and engine manufacturers ample time to complete the necessary development work required to produce a satisfactory blend and arrange world-wide distribution facilities.

If, therefore, the original figure of fifteen years before the mainliner aircraft throws away its reciprocating engines in favour of turbines is correct, at least twelve years of safer flying will be ensured.

Any delay means that development work on existing types of fuel at the expense of safety fuels might re-introduce the whole question of performance difference, and in order that aircraft may travel at cruising speeds 10 m.p.h. faster, this aspect of safety will be sacrificed.

The aircraft at present envisaged can afford to sacrifice a slight increase in the performance offered by fuels of anti-knock rating better than 100 octane, since cruising speeds are already high enough in comparison with other methods of travel to make them economically attractive. Anyhow, there is every reason to suppose that if the same effort is put into the development of safety fuels, their development and improvement would at least be at the same rate as conventional petrol blends.

A decision must be made quickly before advances in other forms of prime mover, or the developments referred to in present types of fuel in order to compete with such advances, make the transition stage so short as to be economically unattractive.

Let us consolidate our position now and show the door to those people whose ideas of safety in the air are based mainly on reducing flying time.

S.M.A.E.'s PETROL MODEL CONTEST

THE Society of Model Aeronautical Engineers (which is the governing body for model aeronautics in Great Britain by agreement with the Royal Aero Club) announces that the first International Competition for petrol-engined model aircraft to be held since the outbreak of war will take place in the spring of 1945.

This will be for the Bowden International Trophy, which needs no introduction to our American Allies, many of whom competed for it in pre-war years.

It is known that there are a large number of American, Canadian, Polish, New Zealand, Australian, etc., model aircraft enthusiasts at present in this country, and the S.M.A.E. invite them all to contact the Honorary Secretary, A. G. Bell, 70, Nelson Road, Hornsey, N.8 (Tel.: Mountview 7322), as soon as possible, so that the most suitable arrangements can be made.

More than two dozen National Contests for model flying are organised each year by the Society, who cater for all aspects of the hobby, ranging from large petrol models and gliders of up to 10 ft. span, down to miniature replicas of full-size aircraft. These latter have proved of invaluable assistance to aircraft spotting and recognition.

Approximately 200 model flying clubs from all parts of Great Britain are affiliated to the S.M.A.E., and there is a special section catering for individual model builders and members of the Allied Forces.

A.T.C. CADETS WITH THE SERVICES

NEARLY 80,000 A.T.C. cadets were at training camps with the Royal Air Force, Royal Naval Air Service, and the U.S.A.A.F. during 1944, and 62,000 of them were airborne in Service aircraft during their training.

These figures are revealed in a letter to the Commanders-in-Chief of all R.A.F. Commands at home, the Flag Officers, Naval Air Stations, and all R.A.F. Station Commanders concerned, expressing the Air Council's "warm appreciation of a notable achievement . . . having regard to their many pressing operational and other commitments."

For security and operational reasons, a ban was placed on holding A.T.C. training camps at many air stations in 1944, but the resulting difficulties were overcome, because remaining stations received additional cadets, "often at some inconvenience."

Flying Training Command took 21,024 cadets; Bomber Command 17,933; Technical Training 9,513; A.D.G.B. (now Fighter Command) 8,918; Coastal 7,111; Transport 2,389; and Royal Naval Air Stations 9,184. Other cadets went to Maintenance Command, to T.A.F. in Britain, the U.S. Army Air Force, and the R.A.F. in Northern Ireland.

Altogether, 76,864 cadets and 4,387 A.T.C. officers had a week or longer at these training camps. This represents 50 per cent. of the Corp's strength in July, 1944, compared with 52 per cent. in 1943, when the handicap of numerous restrictions was not in force.

SOME COASTAL COMMAND PILOTS

Group Capt. the Hon. Max Aitken, D.S.O., D.F.C. and Bar.

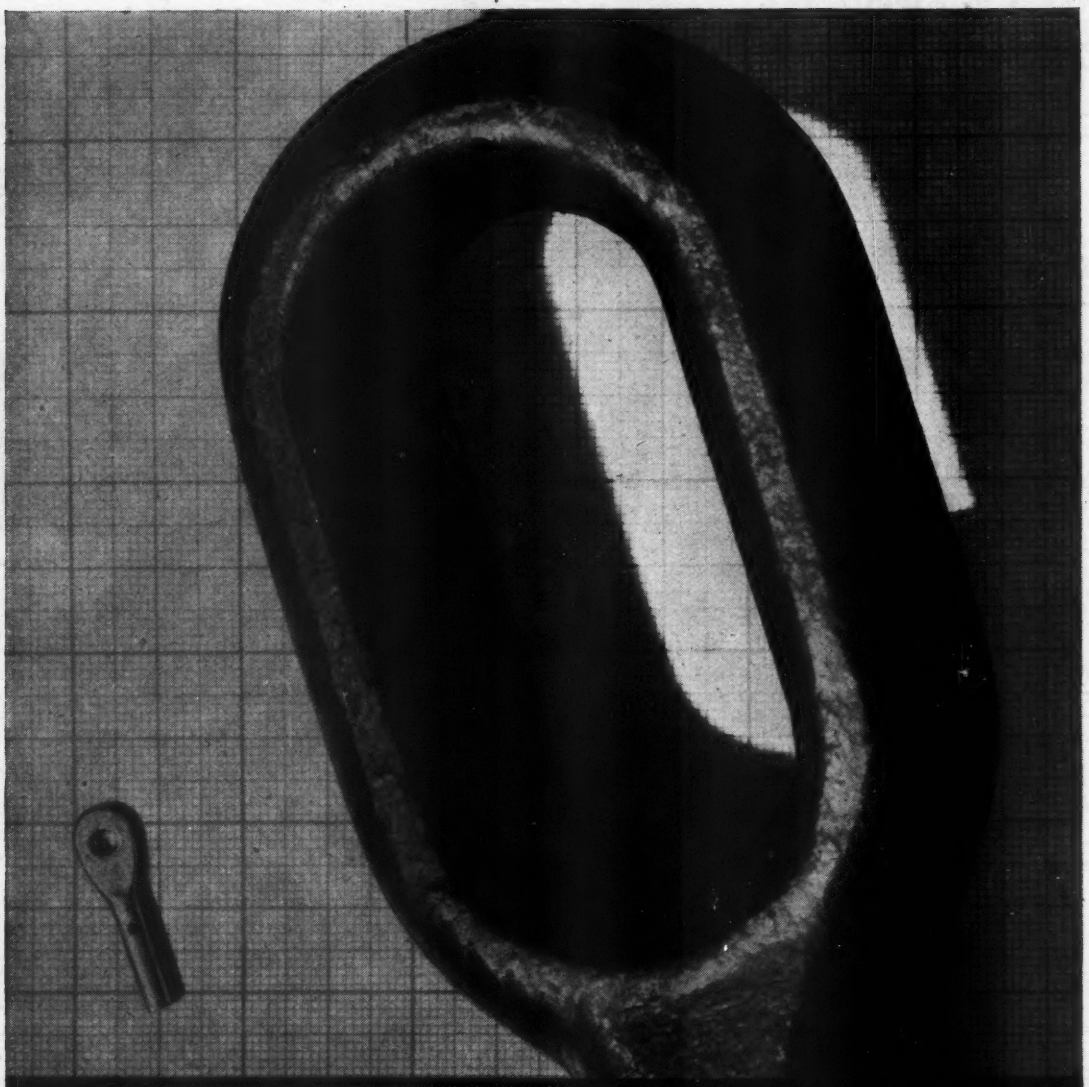
Wing Cdr. G. D. Sise, D.S.O., D.F.C. and Bar, of Dunedin, New Zealand.

Wing Cdr. R. A. Atkinson; D.S.O., D.F.C., of Sydney, Australia.

(Below) Wing Cdr. McConnell, D.S.O., D.F.C.

Sqn. Ldr. "Maurice" D.S.O., D.F.C. and Bar—a Frenchman serving with the Royal Air Force.

Sqn. Ldr. D. C. Pritchard, D.F.C., who, like Wing Cdr. McConnell, is a native of Sussex.



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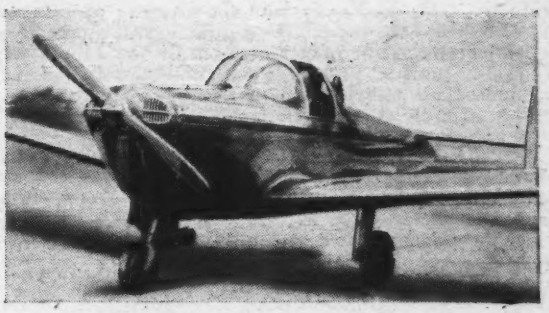
Four Years' Experience With the Ercoupe: No Single Accident Due to Mishandled Turns Near the Ground



Side-by-side seating and a tricycle undercarriage are features of the Ercoupe.

FROM time to time we have recorded in our pages attempts at home and abroad to produce safer aircraft for the private owner. But for the outbreak of war there is little doubt that several such types would have come into general use by now. The chief attack has always been directed towards prevention of the violent spin, but the ways and means chosen by designers have varied widely. Henri Mignet, in his "Pou du Ciel," argued that it was the co-ordination of the three separate controls which was the cause of the trouble, and he therefore did away with the lateral controls. However, he ran into other troubles, into which we need not go here.

Long before that Capt. Geoffrey Hill designed his "Pterodactyl" tailless machines in which the onset of the stall was very gentle, giving the pilot plenty of warning. The same applied, of course, to the Dunne inherently stable machines of the years before the first World War.

Yet another way of preventing the violent spin is by limiting in some way the power of the elevator so that it cannot bring the angle of incidence of the main wing to stalling point, the nose beginning to drop before the critical angle has been reached. A variation on this theme is the tail-first type, in which the front wing is more heavily loaded than the rear main wing so that the nose drops before the main wing can reach stalling angle.

The greatest difficulty encountered by a beginner is the co-ordination of the three controls, and it has long been realised that, if things could be so arranged that only two controls were necessary, a great step would have been made towards simpler flying. The experienced pilot of an orthodox aircraft will not take readily to such an arrangement. He finds it "strange," and it robs him of some of the pleasure of his complete mastery of his aircraft, just as many good drivers miss the satisfaction of perfect gear changes when put on a car with pre-selector gear box.

However, the two-control type of aircraft, as it has been termed, is not intended for the man who is already a skilled pilot, but for the vast potential market that will doubtless be opened after the war if the skill required to fly can be reduced to something comparable with that of driving a car, or, a more apt comparison, with that needed to handle a sailing-boat.

That a number of attempts will be made to solve the by no means easy problems may be taken for granted. On that assumption we have felt that an account given by Mr. Fred. E. Weick, of the Engineering and Research Corporation, to the National Aeronautic Meeting of the Society of Automotive Engineers at Los Angeles last October deserves to be widely known. Mr. Weick began work along these lines many years ago, and in his Los Angeles address he outlined the experience obtained with a number of "Ercoupes" used for training.

Prototype to Production Model

The main data relating to the "Ercoupe" are given in a table on the next page. We might here point out certain changes from the figures which we gave in a description of this machine in *Flight* of September 5th, 1940. At that time the weight empty was 690 lb., and the gross weight 1,125 lb. Doubtless those figures referred to the prototype. As nearly always happens, the production model came out heavier, the gross weight was increased, and the resulting increase in wing and power loading caused a slight reduction in performance, notably in service ceiling. Following are extracts from Mr. Weick's address:—

In order to obtain the desired design aims, three major unconventional design features were used. First, the aircraft was made spinproof and provided with effective lateral control at all speeds. This frees the pilot from the light aircraft's most fatal danger, the loss of lateral control at low speeds. Secondly, the control system was simplified by having both the ailerons and the rudders linked to the control wheel, and eliminating the rudder pedals

The Ercoupe has a pronounced dihedral to its main wing. The rudders and ailerons are both connected to the wheel, and there is no rudder bar to be operated by the feet.

entirely. This does away with the necessity of learning to co-ordinate the usual three separate controls properly, a matter which requires continual practice with the usual controls. Incorrect co-ordination of the controls leads to many serious mishaps even in the case of experienced pilots. Thirdly, the tricycle landing gear is used, which was unconventional when the aircraft was designed, but is now in sufficiently general use to free it more or less from the stigma of unconventionality. With this gear the aircraft can be landed at any speed up to about twice the minimum speed without any tendency to leave the ground again after contact, thus freeing the pilot from the delicate landing technique ordinarily required in making contact at the desired point on the ground and at the particular instant that flying speed is being lost. The tricycle gear reduces the ordinary hazards of ground-looping or nosing-over.

SIMPLER FLYING (CONTINUED)

Starting in the summer of 1940, 112 Ercoupes were built and put into use. In early 1941 their construction was stopped by the war and the resulting restriction on materials. These aircraft have now been in use about four years, and in the present paper the experiences of the users, or what might be termed the results of a four-year actual service test, will be discussed from the viewpoint of the original design aims.

Simple and Easy to Fly.—One indication of the simplicity and ease with which the aircraft handles is given by the fact that a number of non-pilots have handled the controls alone during their first rides in the aircraft, having been coached through the entire procedure of taxiing, taking-off, flying straight paths and turns, approaching and landing. Some of these people were taking their first ride in a small aircraft. In these cases, of course, the real pilots were in command.

There is one interesting case which gives a record of what happened with completely untrained reactions at work solo—with no instructor to guide them. In this case a young woman, who had ridden some as a passenger with her husband, but who had never tried to handle the controls of an airplane, suddenly found herself flying alone in an Ercoupe. The plane had taken off by itself after a misunderstanding in the starting procedure in which she had pushed the throttle in (and opened it wide) when her husband had asked her to close it. At an altitude of about 2,000ft. this suddenly created pilot experimented with the controls, learned how to handle them, and managed to fly around the airport area for about 20 minutes. She then made what was apparently an acceptable approach and landing on the airport, but while the plane was rolling on the ground she again became confused and pushed the throttle in instead of pulling it back, and once more she found herself up in the air. In her next landing she struck the ground with the nose too far down, bounced twice, and slid to a stop, the nose gear having folded back at the last contact.

From this experience it would seem that the controls of the Ercoupe can be mastered readily without formal training, and that they appear to follow natural or instinctive movements, with one exception—the throttle.

In this case incorrect use of the throttle caused both the first and second take-offs, and in certain of the first flights mentioned previously, the natural tendency of the neophyte fliers also appeared to be to open the throttle by pulling it out and to close the throttle by pushing it in. This action is standard for automobile hand throttles.

ERCOUPE DATA

Dimensions

Wing area	142.6 sq. ft.
Chord	5ft.
Span	30ft.
Length	20ft. 9in.
Height	5ft. 11in.
Elevator area	9.4 sq. ft.
Tailplane	10.2 sq. ft.
Rudder area (2)	6 sq. ft.
Fin area (2)	3.3. sq. ft.
Aileron area (2)	16.8 sq. ft.

Full-Load Weights and Performance

Engine	65 h.p. Continental
Power loading	19.4 lb./h.p.
Wing loading	8.8 lb./sq. ft.
Empty weight	725 lb.
Useful load	535 lb.
Gross weight	1,260 lb.
Baggage allowance	60 lb.
Fuel capacity (standard)	23 gals.
Fuel consumption, crusing	4.6 galls./hr.
Oil capacity	4 qts.
Oil consumption	3/4 pt./hr.
Maximum speed	117 m.p.h.
Crusing range	525 miles
Service ceiling	13,000 feet
Rate of climb, first minute	700ft.
Fuel mileage	43 miles per gall.

Quick to Learn to Fly.—The best information available on the time required to learn to fly the Ercoupe comes from two sets of controlled flight training trials. The first one was carried out by the Civil Aeronautics Administration just after the production of the Ercoupe was started, and showed commendable consideration for new development. A number of students were trained to various stages on each of two different Ercoupes at separate bases. The trainees included college students, tradesmen, business and professional men, and housewives, with ages ranging from 18 to 46 years, and with no previous flight training.

One student was soloed after 2 hours and 15 minutes of dual instruction, and the average time required at one unit was 3 hours 31 minutes, while at the other it was 5 hours 7 minutes. The difference is most likely due mainly to the differences in instructors, none of whom had had any substantial previous experience with the aircraft. On the average the time required to solo in the Ercoupe was 53 per cent. of that required for conventional light aircraft in the Civilian Pilot Training Programme then going on in the same unit.

Flying Cross-section

Last winter another flight training programme using Ercoupes was carried out by Parks Air College at bases in five different States. The students were made up of office workers, guards, janitors, mechanics, kitchen personnel, and ground instructors, with ages varying from 20 to 60.

In the Parks programme also large differences in the average time required to solo existed among the different bases. Although these were influenced by the fact that the older students were concentrated largely in one unit with relatively poor field and traffic conditions, they are also an indication that the training methods with the Ercoupe have not yet been developed to the standard of excellence now prevailing in training with conventional aircraft. The Parks training programme was, more or less, based on the present five-hour dual requirement of the Civil Aeronautics Authority, with no particular attempt to reduce the time to a minimum.

The Parks programme included a few students who were carried on to the point where they passed the test for a Private Pilot Certificate. Arrangements had been made with the C.A.A. to have an inspector check the students when their instructors considered them ready, although the rest of the present 25-hour requirement then had to be flown before the certificate was granted without further examination. The Parks results have led to the conclusion that after the student has soloed, 15 hours' additional time is sufficient for a Private Pilot Certificate.

From the two sets of flight tests, C.A.A. and Parks, together with other unassembled experiences in instruction with aircraft of this type, it appears reasonable that with equally well-prepared courses of instruction the time required to solo could be approximately half, and the time required to obtain a Private Pilot Certificate approximately two-thirds, of that with conventional aircraft.

Freedom from Stalling and Spinning.—In 1930 when the study which later resulted in the Ercoupe was begun, the Department of Commerce records of aircraft accidents showed that about two-thirds of the fatal accidents in private flying resulted from loss of control in turns near the ground and inadvertent spins. That this condition has not changed greatly is indicated by the recently stated conclusion of one of our most authoritative students of

safety in flying, Leighton Collins, editor of *Air Facts*. Mr. Collins concludes after six years of accident analysis in the private flight field " . . . in nearly 70 per cent. of fatal accidents the aircraft spun out of a turn, hit the ground with the motor running normally."

After four years of general use no case of an Ercoupe spinning has come to our attention, and what is even more important, there is no indication that there has been a single accident caused by lateral instability or lack of lateral control. There appears to have been no accident associated with a turn in flight.

In the following sections a summary of our experiences, as obtained through users, distributors, the C.A.A. records, and our own flying with the aircraft, will be given for each of the main elements of flight, and for other conditions such as ground handling and comfort. The following sections dwell almost entirely upon such criticisms and difficulties as have come our way, although fortunately this is but a small part of the complete story.

Taxying.—Under ordinary field and weather conditions, taxying and ground manœuvring can usually be accomplished almost without instruction beyond pointing out the throttle and brake handles and explaining their action. Both are operated by hand and are located in the lower central portion of the instrument panel.

The novice often moves the throttle the wrong way at first, but this does not ordinarily lead to difficulty, and he soon becomes accustomed to it. The brake can be locked for parking by revolving the handle a quarter turn.

If, when taxying in an extremely high wind the aircraft should have a tendency to weathercock into the wind, sliding the nose-wheel somewhat against the pilot's control, improved traction and steering control can be obtained by keeping the control wheel forward, applying the brakes a small amount, and turning the handle to lock them if desired, and using greater engine power for taxying.

With its stable tricycle landing gear and clear forward vision, the aircraft can be taxied at high speed if desired, a characteristic which often saves time and patience.

(*To be continued.*)

BRITAIN'S SECRET WEAPON

FOR security reasons it has hitherto been impossible to publish the essential facts of R.D.F., Radiolocation or Radar—the various terms applied to the new technique of locating distant objects, particularly enemy aircraft, by wireless methods. The fundamental principles of the apparatus, which, in the competent hands of the R.A.F., provided the essential tactical information that enabled our meagre fighter force to be employed so decisively against the mass attacks of the *Luftwaffe* during the Battle of Britain, are now published in the February issue of our associated journal *Wireless World*.

The principles of Radar are given by Dr. R. L. Smith-Rose, head of the radio department of the National Physical Laboratory, which was responsible for the initial experiments in the location of distant objects by radio in this country.

There is no doubt that the early establishment and use of Radar contributed largely to both our defensive and offensive operations at various stages of the war. The full story of its success and the technical details of its development cannot yet be given, but it has recently been revealed that in 1941 an Italian fleet off Matapan was blasted from the sea by the guns of British cruisers and destroyers aided by radiolocation in pitch darkness, and that last year the *Scharnhorst* was sunk at an incredible range by battleship gunfire with the help of still more advanced radiolocation gear.

"YOUR PAPER GOES TO WAR"

AIRCRAFT firms are well represented among the concerns which have been visited by "Your Paper Goes to War," the Waste Paper Recovery Association's mobile exhibition now on tour in industrial areas.

A very successful showing was held at Simmonds' Aerocessories on January 15th and 16th, and this was followed by a three-day visit to Sperry Gyroscopes. Employees of Fairey Aviation, Ltd., will see the exhibition during this first week of February.

Workers in the aircraft industry have often been astonished to learn how extensively paper enters into the manufacture of components which they are constantly handling. Paper is used, for example, in more than 1,400 parts of the Lancaster. A section of the exhibition is devoted to various types of wood and paper combinations used for fuselages, propellers and interior equipment, such as the Jablo blade and Exton core.

The exhibition is intended to stimulate the collection of waste paper in factories and drawing offices. That it is still possible to increase tonnage, by enthusiasm and careful salvage, is demonstrated by the latest figures issued by the R.A.F. A special paper drive was launched in January, 1944, which resulted in 34,470 tons of waste paper being collected during 1944, as against 21,468 in 1943.

The Paper Controller has recently issued a warning to the public not to expect a miraculous increase in paper supplies when the war with Germany is over. The shortage is not due to shipping difficulties alone, and salvage will have to continue in this country even after the war.

IN MOTOR ACCIDENT

MEMBERS of the British aviation world who attended the R.Ae.S. debate on civil aviation last week were the first to hear of a motoring accident in which Sir Roy Fedden and Mr. G. H. Dowty were involved. Dr. Roxbee Cox had to take the chair at the debate, and explained that Sir Roy, president of the society, was prevented from doing so by the mishap.

The accident occurred in the Oxford district, when an oncoming army vehicle skidded on the smooth surface and collided with Mr. Dowty's car. The road where the accident occurred is elevated above the surrounding country, and after the collision the car rolled down the embankment. Sir Roy Fedden was bruised, but, fortunately, sustained no serious injury, and he is back at work again. Mr. Edward Dowty, George Dowty's brother, suffered severe injuries from which, we regret to record, he died later. Mr. George Dowty escaped and was able to walk to the nearest town for help. The driver and another occupant got off with minor injuries. His many friends in British aviation will sympathise with Mr. George Dowty in the sad loss he has sustained by the death of his brother.

AIRCRAFT INDUSTRY SCHOLARSHIPS

SEVEN new scholarships in the aircraft industry have just been awarded in the ninth year of the scheme financed by the Society of British Aircraft Constructors.

The successful candidates were chosen from a nation-wide list of applicants. The scholarships are specifically intended to attract to the aircraft industry boys whose financial circumstances would make it impossible for them to take up an aircraft apprenticeship (as distinct from a " trade apprenticeship ").

Each scholarship will, subject to satisfactory progress reports, ordinarily be held for four years. It enables a boy to learn his chosen work with one or other of the leading British aircraft or aircraft engine constructors. Training includes work in design and workshops, and suitable candidates may spend some time in the research and experimental divisions.

In addition, each scholarship holder is expected to attend technical classes to enable qualification at the end of his apprenticeship for Associate Fellowship or Associate Membership of the Royal Aeronautical Society.

The scholarships do not supersede any of the arrangements for training apprentices made by individual firms; they form an addition to, and extension of, existing facilities. Many leading firms to-day have in operation schemes which lead on to universities.

The names of the successful candidates are: Anthony P. Chalk, 10, Seaton Crescent, Monkseaton, Northumberland (Whitby and Monkseaton High School, 1939-44), *to de Havilland Aircraft Co., Ltd.*; John B. Chaplin, 1, Holbeck Avenue, Hemlington, Middlesbrough, Yorks (Acklam Hall Secondary School, 1939-44), *to Miles Aircraft, Ltd.*; Ronald J. Frost, 71, Edinburgh Road, Luton, Chatham, Kent (Medway Technical College, 1942-44), *to Short Bros., Ltd.*; Rodney G. Hinkley, 30, Albion Road, Bexleyheath, Kent (Erith Technical College, 1940-44), *to Fairey Aviation Co., Ltd.*; Anthony W. Hodges, 633, London Road, Isleworth, Middlesex (Isleworth County School, 1943-44), *to Hawker Aircraft, Ltd., Kingston*; Albert W. Kitchenside, South Street, Mayfield, Sussex (Skinner's School, Tunbridge Wells, 1939-44), *to Vickers-Armstrongs, Ltd., Weybridge*; and Richard J. Margetts, High Street, Woodstock, Oxon (Chipping Norton County School, 1939-44), *to Bristol Aeroplane Co., Ltd.*

CIVIL AVIATION

Shiprailair

ROYAL AERONAUTICAL SOCIETY DEBATES THE REASONABLENESS OF SHIPPING AND RAILWAYS TAKING PART IN DEVELOPMENT OF CIVIL AVIATION

SIR ROY FEDDEN, president of the R.Ae.S., was to have taken the chair at the civil aviation debate held by the Society last week, but Dr. Roxbee Cox explained that a motoring accident had prevented him from being present. Of the two vice-presidents one was ill and the other unable to come along, and so it had fallen to him to preside over the meeting. These changes were, presumably, responsible for some slight uncertainty about the wording of the motion for debate, several versions being in circulation.

DR. ROXBEE COX recalled the previous debate held last November, which covered rather too wide a field, and explained that the Council had decided to experiment along another line by having a number of short debates, each on a single subject. If this debate, and the one scheduled for February 8th (now postponed—see p. 116), were deemed a success, the Council of the Society would probably decide to repeat the experiment.

The motion for debate that day was: *"That in the opinion of this meeting it is reasonable that organisations experienced in transport services, for example shipping and railways, should take part in the development of civil aviation."*

Dr. Roxbee Cox said that he intended to call on a proposer and an opposer in turn, those who were speaking in favour of the motion being Mr. Arthur Gouge, Major K. Beaumont and Mr. Farey Jones. Those who would speak against were Mr. D. F. McIntyre, Mr. T. Rice and Group Capt. Williamson. After these six had given their views, the debate would be open for general discussion.

There was one aspect of the debate which he wanted to emphasise. The object was to bring out points in favour of and against the motion and, as in the majority of debates in schools and universities, those in favour and those against were arguing a case and not necessarily stating their personal views. When at the end of the meeting they came to vote, it should again be realised that the meeting was not solely composed of members of the Society, and even if it were it would represent only a very small proportion of the membership. Consequently the vote would reflect the opinion of the gathering and was not to be taken as representing the official view of the Royal Aeronautical Society.

Knowledge and Experience

The first speaker was to have been MR. A. GOUGE but, unfortunately, he was unwell and his remarks were read to the meeting by Capt. J. Laurence Pritchard, Secretary of the Society.

Apart from the financial requirements necessary, Mr. Gouge set out three other main requirements: (1) It was necessary to have some knowledge of the means used for transport; (2) it was necessary to know much about the goods to be transported; (3) it was necessary to have experience of ground facilities which go with and are an essential part of the operation of any transport system.

Concerning (1) it could not be said that either the railway or shipping companies had great knowledge of operating aircraft, although the railways operated aircraft before the war and were doing so now. Certain shipping companies were interested in air transport, particularly overseas. Any lack of experience in this direction should soon be overcome, as immense numbers of young men had been trained during the war both to operate and maintain aircraft. Thus it should be easy to recruit staff with the required knowledge. It was also obvious that in the higher ranks of the R.A.F., particularly Transport Command, there must be well-qualified officers who would be able to undertake management responsibilities.

Regarding (2) there was no question that both railway and shipping companies in the course of their present business had gained all the knowledge required about how to handle passengers and goods. They also knew the mistakes to avoid.

As regards (3) both railway and shipping companies had the necessary knowledge and experience of how to deal with passengers and goods once they arrived at their destination. They had branches all over the world and were, therefore, well situated to start almost at once handling any traffic that might arise.

He could not see but that it was a good thing for the British railway and shipping companies to participate in the development of air transport. If they were not allowed to participate everyone would be excluded, and air transport would be run as a monopoly by some state-controlled body. It seemed to him essential in the development of a new business that encouragement be given to any companies who wished to participate, always providing they were qualified to do so both financially and technically.

Controlled Internal Competition

A certain amount of controlled competition was essential if an efficient industry was to be developed. It might be argued that we should get enough competition from overseas, but he thought that was far from the truth. Any business was improved in its early development by a certain amount of competition, and the problems of other countries were not our problems.

The types of aircraft which had to be developed to run air services to the four quarters of the globe were not necessarily the same as those developed to run airlines internally in another country. We had to do our own development for these particular routes, and a certain amount of controlled competition would help development. In his view there were no people better qualified to run these particular lines than the shipping companies. The same applied generally to the railway companies except that their traffic was very much nearer home.

Mr. Gouge's remarks concluded with the statement that he was strongly of the opinion that it would be a very good thing for air transport if the shipping and railway companies were allowed to participate in the development.

MR. D. F. MCINTYRE, referring to the Chairman's remarks that speakers stated their case and not necessarily their convictions, said that his case coincided exactly with his convictions, formed on twenty years of practical experience in aviation, and especially on the experience of the last four years at an airport handling a large volume of international air transport. He thought it should be clearly appreciated that air transport was an entirely new and revolutionary form of transport—entirely different in technique, method and mentality from any older form of surface transport. In the course of forty years it had been developed logically and efficiently by men of aviation minds. It was they who, by skill, enterprise, courage and devotion, had overcome not only the mechanical problems, but lack of funds and public apathy and brought air transport to where it was to-day. He thought it would be deplorable if, having reached this stage, a meeting of the Royal Aeronautical Society considered that aviation men were now incapable of running their own business.

As they might imagine, Mr. McIntyre continued, he was not pleading for a square deal for the railways, except in their own sphere, his case was that of a square deal for the British public. His own experiences had proved that there was nothing that surface transport could contribute, apart from money and political pull, both of which aviation would be much better without unless it was the right type of money and the right type of political pull, directed solely towards the enlargement and development of air transport.

The plea was normally made by railway and shipping companies that their existing ticket offices, agencies and other facilities would be of advantage to air services. The hard fact was that air transport had already built up for itself a technique and psychology of passenger and freight handling and

ticket system on entirely new and modern lines. It would be a retrograde step for air transport to revert to the old-fashioned methods. "Co-ordination of transport" and "wasteful competition" were stock phrases. Co-ordination of transport was a simple function of Government, whose powers in this respect could not be usurped by commercial undertakings. Did not all this talk sound remarkably like a formula for a commercial monopoly? It would be time enough to talk of co-ordination of air transport when the air lines had brought one-class air fares to the travelling public below that of third-class railway fares. That stage would be reached within five years if aviation companies who were in aviation for aviation's sake were allowed to apply their virile determination to this aim. He need not ask the audience to imagine how far British railways would have been developed if their growth and encouragement had been in the hands of stage-coach operators and canal companies.

Mr. McIntyre then outlined the system in force in the United States, where the test applied to all new transport undertakings was the clear practical test of public necessity and convenience. If that test were applicable in this country there would have been no need for such a debate as this one. He recalled the case of an American shipping company which had developed an overseas airline and was forced by law to divest itself of all interest in that airline. He argued that where an older form of transport controlled a new, there must be a tendency to provide a safeguard for the small minority of the public who were shareholders to the detriment of the larger majority of the population who were not. But the majority of the population was entitled to all of the benefits of the new instrument.

Mr. McIntyre concluded with the following words: "As you may have gathered I do not think that railway or shipping companies should take a part in air transport. In a word, let us reject this motion and commit the future of British aviation to aviation minds."

SHIPRAILAIR (Continued)

Flying Heroics

MAJOR K. BEAUMONT recalled that 25 years ago a pilot who made a journey from London to Paris was a hero, and so were the passengers, in aircraft which could only just be hoicked over the boundaries of muddy airfields before the single engine overheated and stalled. In those days air transport was difficult and dangerous, a matter for experts in piloting, navigation, maintenance, etc. Nowadays, with concrete runways, automatic pilots, radar, radio, beams, blind-landing facilities, multi-engines that seldom failed, greatly increased range and speed and a constant supply of expert flying, navigational and maintenance personnel available from Transport Command and the R.A.F., the movement of the vehicle from one point to another over long stages was one of the problems most easy of solution.

In international air transport there were more knotty problems common to all forms of international carriage. These problems were common to international carriage generally and outweighed greatly in importance and number the problems peculiar to air transport. In all such matters international shipping and railway undertakings had acquired a mass of knowledge and experience which constituted a good foundation for exploiting air transport. In the case of international shipping companies, they had foreign bases and experienced agencies ready to handle traffic in a manner to which passengers and shippers were accustomed.

Naturally they would have to acquire the specialised knowledge indispensable for air operation, but this knowledge was readily available on application to those who had for many years made a special study of the subject. He thought he would like to copy Sir Frederick Handley Page's habit of calling attention to his own products—in this case himself! Similar arguments applied in internal air transport where the differences between the air and older forms of transport were fewer. Consequently it should be easier for the surface carrier to adapt himself to transport by means of the more modern vehicle.

It was sometimes objected that if surface carriers undertook air operations, their tendency would be to suppress the air side. He suggested that no carrier enlightened enough to balance his fleet by the incorporation of the most modern vehicles would be so foolish, especially if confronted by international competition. If he did not provide his customers with the form and class of transport they required, at or below the cost at which it could be obtained from his rivals, he would lose his business and go broke. He could not see that users of transport would suffer in consequence of surface carriers being allowed to enter into competition. On the contrary, the travelling public and other taxpayers should benefit from enlargement of the field of potential air carriers.

MR. T. A. RICE prefaced his remarks by stating that what he was going to say did not necessarily represent the views of the management of Pan American Airways. He explained that many years ago the Congress of the United States passed an Act which in fact made it unlawful for a railway company or other common carrier to control any common carrier by water with whom the railway or other carrier might compete for traffic. A Congressional Committee which sponsored this act made the following statement: "The proper function of a railroad corporation is to operate trains on its tracks, not to occupy the waters with ships in mock competition with itself, which in reality would operate to the extinction of all genuine competition."

That statement was made in 1912, but did it not make just as much good sound sense to-day? The Congress of the United States had consistently sought to prevent companies engaged in one form of transportation from having controlling interests in companies engaged in another. Basically it had determined that the different forms of transportation should be developed as independent industries. This policy rested upon a variety of considerations, among which were the fear that the older forms of transportation—as a result of their established position and financial power—might dominate and restrict the newer; the belief that newer forms of transportation could be developed more effectively by companies not controlled by carriers engaged in a competing form of transportation; and the desire to restrict interlocking relationships between competitive interests in public service generally. American steamship companies were now strenuously endeavouring to have this policy rescinded.

Mr. Rice then outlined some of the arguments used by the steamship companies. He commented that it was all very well to say that joint operation of ships and aircraft along the same routes would not be detrimental to the full development of civil aviation, but, he said, put yourself in the position of the directors of such a company. Your company has a very large investment in shipping and a very much smaller investment in its auxiliary airline. As business men and as servants of your shareholders, is it not your obvious duty to increase the return on your large investment wherever possible at the expense of the return on your smaller one? Surely civil aviation deserved a better fate than that.

As for the time-worn argument of the steamship companies that their present ticket offices, ground staffs, etc., would be beneficial to the development of civil aviation; actually the two forms of transportation were so essentially and fundamentally different that the present ground organisation would be of little use in the development of a ground organisation competent to handle air traffic. Air operation required specialised personnel, such as despatchers, meteorologists, aircraft and engine mechanics, and even the sales and traffic-handling personnel must use an approach and technique entirely different from their counterparts in the much slower land and sea transport companies. Aviation was essentially dynamic, and surely it was not fair to the travelling public to tie this fast-moving industry to the established organisation of surface transport. Even granting, which he did not, that the exising ground offices of surface transport would be of benefit to the development of civil aviation, without any doubt it was far simpler to establish an office at the end of an airline than it was to establish an airline at the end of an office!

Integrated Transport

Now as to the integrated transportation system of which they had heard so much. He admitted the benefits of integration, but did not admit it was necessary to put all the various forms of transport under one management to obtain this integration. It was quite feasible to integrate transportation through traffic conferences, operators' associations, agency agreements and in numerous other ways.

As for the argument about modernising transport services, viz., the comparison between the change from ship to plane with the change from sail to steam. It was one thing to change one's method of propulsion and quite another to change the entire medium and the vehicle. He thought the surface transport people's fears of competition from the air was exaggerated, since airlines should primarily create their own traffic.

Mr. Rice concluded by saying that he believed most sincerely that the operation of airlines by surface transport interests would be harmful to the full development of civil aviation. Further, he thought it only fair to say that so far as his own country was concerned—and he said it because of

SHIPRAILAIR

fundamental personal beliefs and certainly without any implications whatever—that he had to admit he would vastly prefer to see American commercial airlines operated by even a privately owned taxicab company rather than by the Government.

Mr. FAREY JONES, speaking in favour of the motion, said that having listened to the very remarkable speech by Mr. McIntyre and knowing the great work that his company had done so very efficiently, and putting his and Mr. Rice's remarks side by side, he could not help feeling very much as Alice in Wonderland must have felt. Here we were in 1945, and a great leader of Scottish aviation, and a doughty champion imported from the other side of the water had to be put up to oppose this motion, try to prove that there is no room for railway and shipping personnel to participate in air transport.

After all, what does air transport seek to do? Were they concerned, directly or indirectly, with air transport seeking to create a marvellous old-school-tie complex, to claim that because they were airmen they were several degrees above experienced personnel in shipping or railways, and that only they, as airmen, could take part in the development of air transport? That was a complete fallacy, and the man-in-the-street would only use air transport when the air transport provided would take him anywhere he wanted to go with the maximum of safety and the minimum of delay. Because air transport, so far as we in Britain were concerned, was not a matter of covering the British Isles only, but had to be regarded as a matter for the British Commonwealth, it was inevitable, sooner or later, that any single journey which the average air passenger would take would involve, at some part of the distance between his home and his destination, the use of a bus, a train or a ship. We could not divorce those three from air transport. In his opinion air transport, if it aimed at anything at all, aimed at the carriage of the maximum number of people and the maximum amount of cargo to the maximum number of places in the shortest possible time and with the minimum of inconvenience. We could not achieve such an object without some form of rail-sea-air co-ordination.

If this war had taught us anything at all, it must have taught us at least one thing. He remembered fighting the railways—fighting them in the Press and in the Lobbies of the House of Commons—over the old booking ban; and in the long run the very "red flag" attitude they adopted was beaten. But we had now travelled a long way beyond that stage. The world had been turned upside-down since 1939, and one of the main lessons which this war had taught us was that the Navy, Army and Air Force are interdependent. When all three Services had been welded together into a co-operative whole, the force of their blows was more than trebled. That applied equally to shipping, railways and air transport. The railways delivered passengers and freight to the ports and docks; the shipping companies took them over the oceans to other ports and docks, where they were again picked up by the railways. The railways and shipping companies had immense operating systems covering the whole Empire.

Civil Air Authority

Sooner or later we should adopt something on the lines of that which had been adopted by our American friends, with good results. We should give some British organisation the powers of the Civil Aeronautical Authority. Then we could say that if a shipping or railway company wanted to come into the air business it must form an air company; it might use some part of its shipping or rail business, but it must not come in purely as a shipping or rail line, because there must be some co-ordination.

He supposed that at least one-third of the wealth of the British Commonwealth had been destroyed during the last five years. We were faced with the task of rehabilitation, not only of the British Empire, but also of certain nations in Europe who had fought side by side with us. When the war ended we should be faced with the task of providing the day-to-day bread and butter for our people, and unless air transport was allowed to play a vital part in that work we might just as well pack up shop now. Air transport must bring to Britain and to British people everywhere something of the standard of life which our friends in America enjoyed.

When the war was over we had to rebuild our trade with South America and other foreign countries. Could anyone imagine that we could exclude the shipping companies from that?

GROUP CAPTAIN WILLIAMSON recalled a story related of the late Frank Pick, to whom a friend asserted that London Passenger Transport was 2,000 years out of date. When Pick protested that his was an overstatement the gentleman replied: "The Good Book tells us that 2,000 years ago Balaam went down to the city sitting upon his ass; but I go down to the City every morning and have to hang on a strap." Two thousand years ago the Good Book also prophesied that the lion would lie down with the lamb. It was now proposed that this should come about in the form of surface transport participating in air transport. It was possible that there might be incompatibility. What would be thought of suggesting that a canal company should take over the running of railway lines? There might be gas companies which also operated electric utilities, and they had heard of railways which would undertake the running of road haulage companies. Some would remember how the canals had prospered under railway control.

Air Safety

Group Captain Williamson recalled a very important paper read to the society by Dr. Roxbee Cox in which he had placed the safety feature first. The Air Registration Board was doing excellent work in approving licensed engineers and in keeping up the standards of maintenance work. He doubted if this feature of safety-first would be achieved if airlines were to be controlled by other than disinterested directors. During the war there had been examples of expediency overruling the policy of safety-first. Following recent accidents it was said that military expediency had resulted in more admirals being lost in the air than at sea.

Air experts knew how to take advantage of research and development. The same could hardly be said of shipping and railways. He had noticed that at sea, if a vessel wanted to communicate with another or with the shore a lot of little flags were hoisted. On the railways, if it was urgently necessary to communicate with a train, they had to 'phone down the line and get a man to put a couple of Chinese crackers on the rails as the only means of telling the driver to stop. He suggested that the railways should start with something a little easier, say, the canals, before they were given the more difficult task of air transport.

As for the shipping companies, it had been estimated that the annual amount of air cargo would be some 10,000 tons. That was nothing to a shipping company and could be carried in one voyage. The suggestion was, presumably, that *all* shipping companies should be allowed to participate in air transport. Since something like thirty aircraft could do the work, each firm would have 1½ aircraft to operate—hardly an economical proposition.

MR. GANDAR DOWER, through having committed himself in a letter to *The Times* some time ago, found himself obliged to speak "in favour" of the motion. He argued that no monopolies should be permitted. Shipping, he thought, had a more natural claim than the railways to participation in air transport, and shipping firms should be allowed to run air lines along any of their routes on which there was not already an independent air line operating there and doing it successfully. He pointed out that it did seem as if the shipping firms were not interested until now. They were not interested while aviation was struggling, and the railway companies had done nothing, from 1933 to 1938, except hold back air transport. When the Scandinavian route—Newcastle, Stavanger, Oslo—was opened in 1937, with a proposed extension to Stockholm, Helsingfors and Leningrad, railway and shipping companies were approached, but none wished to participate. He pleaded for a restoration of the Air Transport Licensing Authority.

GROUP CAPT. S. A. DISMORE thought the air people should welcome everybody who could contribute, but he was against surface transport having *control*. It was wrong for one form of transport to have control of another form. And, he added, don't let it be controlled by financiers. When his old firm (Imperial Airways) was formed the money was subscribed in a very short time by the usual types of investor—by people who had faith. He pleaded that civil aviation should be left to those who had *faith* in it.

MR. THEODORE INSTONE suggested that the motion should have stated that surface concerns should have a "right to take a prominent part" in the development of aviation. He pointed out that the meeting was a bit late in debating the subject, since the railways had been running air services for years, while he and his brothers were the first shipping firm to run air services. He referred to the numerous committees, official and unofficial, formed to urge the importance of civil aviation. All had agreed that surface transport should take part in air development. We did not want monopolies, but healthy competition.

After a few more speakers had contributed their remarks, the tellers got busy on a showing of hands and, somewhat surprisingly, the count was: "For the motion, 69; against, 47.

CIVIL AVIATION NEWS

U.S.–ICELAND

THE signing of a civil aviation agreement between the U.S. and Iceland is reported by *American Aviation Daily*. Washington official circles described the report, however, as "somewhat premature."

INTERPRETATION

THAT Russia's absence from the Chicago Air Conference indicates that the Soviet Union does not intend to permit the flight of foreign aircraft across her territory is the view of Mr. William Burden, U.S. Assistant Secretary of Commerce.

The Soviet Union will also not take part actively in long-range international air transport in the immediate post-war future, Mr. Burden thinks.

Mr. Burden, who was an American delegate to the Chicago Conference last November, expressed these views in *National Aeronautics*, organ of the National Aeronautics Association.

AIR FREIGHT PROSPECTS

THE post-war air cargo potential between U.S. and Argentine is estimated to be much higher than the 1939 level. A report of the Bureau of Foreign and Domestic Commerce reveals that in 1939 401 different commodities were exported by air from U.S. to Argentina of total value of over 12 million dollars.

The report predicts a substantial diversion of water-borne freight to air lines and the development of new cargo traffic in new articles, notably perishable goods for the American consumer market.

FORECAST

SPEAKING of the next 25 years in aviation, Dr. C. C. Furnas, Curtiss-Wright aircraft research director, suggested that four types of aircraft will probably be required to handle passenger traffic, on branch lines, trunk lines and for overseas work, their capacity varying from 10 to 100 passengers. The number of passenger-miles covered in the United States in 1940, the last normal year, was 1,000,000,000 compared with seven billion passenger-miles by railway and 11 billion miles by bus. In 1950, it is estimated, the number of air passenger-miles will be as high as seven billion.

By that time, Dr. Furnas said, most of the mail will be carried by air. Freight will aggregate 110,000,000 ton-miles.

VICKERS-ARMSTRONGS TRANSPORT

BELIEVING that in the immediate post-war period there will be a considerable demand for air travel over moderate distances, Vickers-Armstrongs, Ltd., are pushing ahead towards the production of a civil transport accommodating 27 passengers and capable of a still-air range of up to 1,850 miles.

Design work on this Hercules-powered aircraft, to be known as the V.C.1, is nearly complete and actual construction of the first of three prototypes to the order of M.A.P. is well advanced.

The primary consideration has been to design a machine of low initial cost and which can be put into quantity production at the earliest possible moment.

For this reason use has been made of a considerable number of components from aircraft which are already in production by the firm.

This has the additional advantage that a large proportion of spares already exists in vast quantities and could be made available to the airline operator with the delivery of the first aircraft—a very important consideration.

The fuselage is of stressed-skin construction throughout and the wing attachments have been specially designed to prevent vibration being transmitted to the cabin.

The passenger saloon has internal dimensions of 29ft 10in. length, 7ft. 11in. width, and. 6ft. 8in. headroom, and the cabin accommodation includes toilet compartments and steward's pantry, while ample quarters for a flying crew of two are located in the nose.

Cargo holds capable of carrying some 3,000 lb. of baggage, freight and mail occupy the bottom of the fuselage below the cabin floor.

The aircraft has a span of 89ft. 3in., an overall length of 62ft. 7in., and a height of 19ft. 3in., while the performance estimate shows a cruising speed in excess of 200 m.p.h. at 10,000ft. altitude, at not more than 50 per cent. take-off power.

LESS PROFIT

DESPITE an increase in traffic volume and miles flown, American airlines showed by the end of 1944 a lower net operating revenue than in 1943.

This was mainly due to the increase of operating expenses which in 1944 were about $25,000,000 higher than in 1943.

NEIGHBOURLY TALKS

THE U.S. and Canadian Governments made arrangements for discussions on Civil Aviation to cover matters arising out of the recent international civil aviation conference in Chicago, and the review of the 1940 arrangements for allocation of Civil Air Routes between the two countries.

The names of the U.S. delegation were announced as follows: Mr. Stokely W. Morgan, Chief of the Aviation Division, Department of State; Mr. J. G. Parsons, Division of British Commonwealth Affairs, Department of State; Mr. Edward P. Warner, Vice-chairman of the Civil Aeronautics Board; Mr. Oswald Ryan, Member of the Civil Aeronautics Board; and Mr. Lewis Clark, First Secretary of the American Embassy in Ottawa.

AGREEMENT WITH ETHIOPIA

AN agreement concluded between the U.K. and the Ethiopian Government contains the provision for an exchange of air transport facilities. Under Art. IX (1) the Government of the U.K. will accord to Ethiopian civil aircraft freedom of passage to, in and over territories under their authority and the Ethiopian Government will permit a British air transport organisation, to be designated by the U.K. Government, to operate regular service to, in and over Ethiopia for the carriage of passengers, mail and freight.

For this purpose the Ethiopian Government undertook to secure the constant maintenance of adequate landing grounds and to allow their use to British operators.

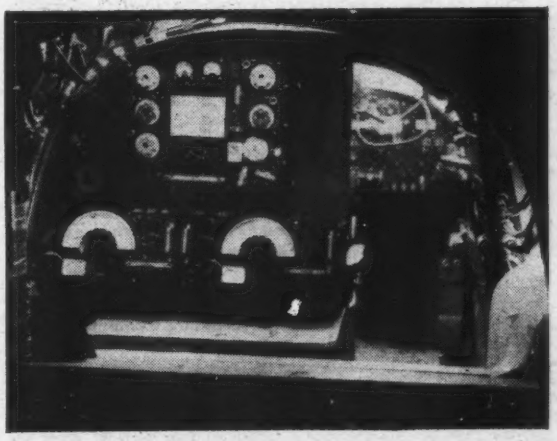
Should any of these obligations of either party come in conflict with a future general civil aviation international agreement, they will be modified so far as it may be necessary to avoid such conflict.

RECIPROCITY

BACK at work after his recent illness, Mr. John Curtin, Commonwealth Prime Minister, said that landing rights to American aircraft in Australia would be negotiated on a reciprocal basis for Australian aircraft landing in U.S.

Mr. Curtin fully endorsed the Cabinet's decision to nationalise inter-state airways, which will protect them from external influence in control and direction.

"An attempt was made recently by foreign capital to capture, with an offer of fantastic profits, the control of Australian airlines," he added.



SPARKS OFFICE: The wireless operator's panel, just aft of the navigator's station, in the Lancastrian, a description of which appears elsewhere in this issue.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

ABOUT AMPHIBIANS

A Question of Efficiency

I SHOULD like to suggest to your correspondent, Mr. Hancock (*Flight*, January 18th) that, although the sacrifice in weight and efficiency in making a seaplane amphibious would be less than the sacrifice for a flying boat, the overall efficiency of the former would still be well below that of the boat.

In any case, if the system of mounting the wheel in the float were considered, how is Mr. Hancock going to get adequate wheel travel, allowing for the fact that the all-up weight of a modern machine is considerably greater than that of the old Flycatcher.

P. R. PAYNE.

ASYMMETRY AGAIN

Less Manœuvrable than Conventional Types

I READ with considerable interest Roger Tennant's article (*Flight*, January 11th) on the subject of ultra-long-range fighters, for I think the subject requires clarification. To-day we have two distinct types of long-range fighter—the ordinary single-seat fighter overloaded with jettisonable long-range tanks, and the two-seat fighter which carries its own navigator; the latter type can also carry an overload of fuel.

The first type, more manœuvrable than the second, appears to have reached the limit of its range because the length of take-off and the structural strength of the aircraft set a limit to the fuel load, and the strain on the pilot to the duration of flight. This limit is about 2,500 miles. The conventional two-seat twin-engine aircraft, with a total of 3,000 h.p., has a range of 1,600 miles and a consumption of three m.p.g.; one type of aircraft in this class has taken a load of 2,000 lb. of bombs in addition with ease. It could, instead, take 750 gallons of fuel in external tanks if suitably modified. This would weigh 3,300 lb. and give a total range of just over 3,000 miles. This would provide a useful stop-gap for the Pacific war.

For a more permanent solution I would suggest one of the types which Roger Tennant rejects, with engines in the fuselage and right-angle shaft drive to the airscrews in front of the wings. This would entail distributing weights far from the vertical and lateral axes, but very near the longitudinal axis, which is much more important. The disadvantage is an increase in one of the minor limitations of rate of turn, the advantages the ability to cruise on one motor without yaw, and more rapid roll.

The machine suggested by Mr. Tennant, on the other hand, appears to be dependent on an unreliable glider, to be less streamlined and manœuvrable than the conventional type would be, and to be unable to achieve the performance figures laid down.

J. G. HENRY.

AIRBORNE OUNCES

Rivals to Heath Robinson

THE undersigned, working under the theory upheld by Mr. C. L. Brokenshaw (*Flight*, January 4th), have devised equipment for shooting ducks at night or in English fog. Our device consists of a metal plate six feet by six feet, set horizontally on springs about a foot from the ground. Through an electrical system a gun, aimed over the area of the plate, is fired when the plate is forced downward from the weight of the bird flying over it.

We have not been able to test it under actual conditions but if it fails we shall suppose it is because Mr. Brokenshaw has neglected to regard the fact that he is dealing with dynamic forces and that hydrostatic pressure is equal in all directions.

We are not ornithologists, but we believe that a bird remains aloft by exerting a force on the air by the downward sweep of its wings, the air in turn exerting (according to Newton's third law) an upward force on the bird. In moving its wings downward the bird displaces a certain quantity of air. Since air has mass and has been set in motion it possesses momentum. (Momentum = Mass × Velocity). Now, if this air is allowed to impinge upon an object (in the case of this problem, the floor of the cage), a force is exerted on that object, since the rate of change of momentum is force. (Force = Mass × Acceleration.) This argument then would tend to uphold Mr. Brokenshaw's conclusions and no doubt does as long as the bird remains very close to the floor of the cage, but as soon as the bird is at any appreciable height from the floor compression of the air takes place due to the air already in motion tending to set successive layers of air in motion. This hydrostatic pressure is equal in all directions and is dissipated in all directions to the surrounding atmosphere. Therefore, the force exerted on the floor of the cage and, ultimately the reading of the scale, is dependent upon the height of the bird from the floor.

CAPT. W. G. GOEBERT.
1ST LT. J. W. READ.

ORGANISING FOR EFFICIENCY

Operating Costs and Speed

IN *Flight* of January 11th Mr. Colin C. Richardson makes the somewhat sweeping statement that it is useless to design an aircraft with a cruising speed of 130 m.p.h. as it simply cannot cope against strong headwinds.

Whilst one need not dwell thereon, it nevertheless is a fact that for many years prior to this war aircraft with cruising speeds of less than 130 m.p.h. were maintaining the majority of our Empire Air Services.

Be that as it may, the Bristol Aeroplane Company have not let the grass grow under their feet, and if a cruising speed of 130 m.p.h. is quoted this should not be read out of the text. What your correspondent has obviously overlooked is that, in designing the Bristol Freighter, we have concentrated on providing a specialised machine for the specific purpose of air freighting, where operating cost takes pride of place over block to block speed. In point of fact, the still-air speed of the Bristol Freighter on 60 per cent. of take-off power is 170 m.p.h., and the all-out level speed obviously well in excess of this.

It is, however, our contention that the thinking freight operator of post-war years will appreciate that if he is to establish his business on a profit-making basis, he will require a machine which combines high payload with low operating cost and 100 per cent. reliability with minimal maintenance cost. Such a combination cannot be achieved at high speeds—hence the logical evolution of the Bristol Freighter.

K. BARTLETT, Sales Director,
Bristol Aeroplane Co., Ltd.

AIR CARGO TRANSPORT

Time on Ground a Vital Factor

THE question raised in the correspondence in your columns (*Flight*, December 7th and January 11th) as to whether a fortune can be made by transporting cargo in a specialised machine such as the Bristol Freighter will doubtless depend upon the exigencies of the Chancellor of the Exchequer.

We must, therefore, confine our attentions to the question as to whether such a machine is likely to provide the means of earning rich reward regardless of what will become of our ill-gotten gains. I suggest that a machine such as the one referred to, will be one of the first machines to do so if correctly operated.

It is not surprising that your correspondents are somewhat at variance on the subject of the annual number of hours to be flown in order to attain the low costs per ton-mile which have been quoted for the machine in question, for it would seem that insufficient attention has been paid in the past to the vital necessity of achieving 3,000 flying hours per annum as a minimum if air-freight is to come into its own.

Given the most economical, reliable machine, which we are given to understand the Bristol Freighter will be, and sufficient freight to ensure, say, a 75 per cent. load factor, which again we are told will certainly be available if the freight rates are right, then the main factor would seem to be the necessity of reducing the forced time on the ground for an air cargo liner, which at present would seem, even under the most favourable conditions, to be one hour's loading for one hour's flying. A somewhat frightening figure, but one which can be reduced by a half or more if ground organisation is given the attention it undoubtedly calls for, and, what is still more important, if some form of pre-loading is introduced.

The figures of annual operating hours quoted from America can become a snare and a delusion for the would-be air-freight operator unless it is realised that it is one thing to embark or

CORRESPONDENCE

disembark 25 passengers and another to load or unload 4 or 5 tons of mixed freight, particularly with inter-stage traffic.

If, therefore, the time on the ground can be cut by half, as it certainly can be by organised pre-loading, then there is, in my opinion, no reason why 3,500 hours per annum should not be flown, and that is a basis upon which hitherto unheard of profits should be attainable. "PRIVATE OWNER."

IMPLICATIONS OF V2

Astronautical Possibilities Over-estimated

REFERRING to Mr. Burgess's letter in *Flight* of January 1st, it appears that one or two mistakes occurred in your correspondent's numerical calculations, and consequently the astronautical possibilities inherent in the German rocket appear to have been over-estimated.

In support of this, my opinion, you will perhaps allow me to submit a short calculation which, by the way, is largely analogous to Mr. Burgess's.

Using the equation:

$$V = v \ln \frac{M_o}{M_t} - gt \text{ .....} \quad (1)$$

and assuming the same figures and conditions respectively as Mr. Burgess does, i.e., vertical flight, $v = 2{,}820$ m./sec., and the time taken to reach the final velocity (at which moment the fuel is exhausted) to be 46.5 seconds (Mr. Burgess's 456 km./sec. divided by $g = 9.81$ m./sec.^{2}), the final velocity is—

$$V = 2.82 \ln 3.42 - 0.456 = 3.010 \text{ km./sec.},$$

whereas your correspondent makes it 4.776 km./sec.

In conformity with Mr. Burgess, I assume that V_1, the final velocity actually reached, is only 95 per cent. approximately of its theoretical figure; i.e.,

$$V_1 = 2.85 \text{ km./sec.}$$

At the moment of attaining this speed the small rocket is supposed to start, and its equation of velocity is:

$$V = V_1 + v \ln \frac{m_o}{m_t} - gt \text{ .....} \quad (2)$$

Whereby V_1 and v are taken as previously, m_o and m_t denote the mass of the small rocket at the moment of leaving the "mother rocket" and at the moment of fuel exhaustion respectively. Furthermore, I have assumed (knowing this to be debatable) $t = 50$ seconds. (There is no explicit indication as to what Mr. Burgess's respective assumption is.)

In order to leave the earth for good, the projectile must attain a velocity of 11.2 km./sec.

Introducing all that into equation (2), we get:

$$11.2 = 2.85 + 2.82 \ln \frac{m_o}{m_t} - 0.490.$$

or $\ln \frac{m_o}{m_t} = \frac{8.84}{2.82} = 3{,}134$, which gives $\frac{m_o}{m_t} = e^{3.134} = 22.966 = R$

whereas your correspondent's result is R = 10.

In other words, the 1,000 kg. of the second (small) rocket must consist of 956.5 kg. of fuel, and for the body and the somewhat complicated machinery which, no doubt, is indispensable to obtain an efflux velocity of 2,820 m./sec., there would be left only 43.5 kg. At present, however, a suitable machinery of such weight seems not to be a practical possibility.

May I add that I do not want to be taken as implying that it will always remain impossible for a rocket to leave the gravitational field of the earth; I merely wanted to point out that, making the same assumptions regarding the numerical values for efflux velocity, mass, time, etc., as your correspondent, the actual result appears to be less favourable than the one Mr. Burgess obtains and which may have induced him as well as others to take too optimistic a view regarding the present possibilities of "reaching for the moon" by means of a slightly modified weapon of modern war.

J. A. BECKER.

Query on Calculations

IN view of the very interesting letters published in your paper regarding rocket flight, I would like to take this opportunity of pointing out a few statements in Mr. Gatland's and Mr. E. Burgess's letters which have puzzled me, and I find it impossible to agree with certain of their figures and results.

The letter by Mr. K. W. Gatland in your issue of 11th January, 1945, is of very great interest with regard to the final velocity "V" of the V2, if adopted for vertical flight. I was very surprised to see that a load ratio "R" of 7 had been taken when dealing with the final velocity "V." Surely a figure of 4 would be more accurate, especially as Mr. Burgess gives this figure as 3.42, which, if the details now officially released are correct, is quite sound.

Admittedly Mr. Gatland was working on the assumption that the initial total weight of the V2 was 15 tons, whereas Mr. Burgess used the official figure of 12 tons in his calculations; but the weight error of 3 tons should certainly not affect the load ratio to such an extent, and I fail to see how a rocket could be constructed, the structure in this case also comprising of rocket engine plus pumps, tankage and feed lines, etc., for a total weight of 2 tons, and carrying 12 tons (dead load) of fuel.

Also Mr. K. W. Gatland uses the formula :—

$V = v \log_e R. = 3 \log_e 7 = 6$ Km./Sec.

and Mr. Burgess is using the formula :—

$V = v \log_e R. - gt.$

It will be noted that the final velocity will be greatest if Mr. Gatland's formula is used, yet both values worked out approximately equal (3 m.p.s. or 5 Km./Sec.).

In the above equation Mr. Burgess gets the following values :—

$V = (2.82 \log_e 3.42) - .456$ Km./Sec. $= 4.776$ Km./Sec.

which, on calculating, gives a figure of 3.011 Km./Sec. This figure of 4.776 Km./Sec. is certainly not correct if the values in the above equation have been used to obtain this value of 4.776 Km./Sec.

Mr. Burgess gives a figure of 50 per cent. for his thermal efficiency, giving an exhaust gas speed of 2.82 Km./Sec. I am certain that this figure of 50 per cent. is rather low in the face of present-day developments, and will be nearer the 80 per cent. mark than 50 per cent.

The losses found by experimental work on rocket engines come under the following groups :—

1. Chemical losses due to incomplete combustion owing to bad mixing, and lack of oxygen.
2. Exhaust losses through incomplete combustion, and the cooling of the exhaust gases.
3. Losses due to faulty feed pipes, and poor mixing in fuel nozzles.

The losses in No. 1 may be put at approximately 5 per cent., and in No. 2, 10 to 15 per cent.; No. 3 around 3 per cent. These figures put the total thermal losses around 18 per cent. to 23 per cent., and as there are no further loss factors in a rocket engine, the mean thermal efficiency can be taken at 80 per cent.

Working on this figure :—

$$m = \left(\frac{v}{vt}\right)^2 \therefore v = 3.576 \text{ Km./Sec. (2.22 m.p.s.)}$$

It is assumed the value for vt is 4 Km./Sec. taking a thrust of 24 tons (53,760 lbs.), this is working on a given design figure of $1g$ (32.2. f.p.s.)

Reaction $= mv.$, where m = the mass burnt in 1 sec. v = actual gas velocity.

$53{,}760 = m \times 11{,}721$ (2.22 m.p.sec. 11,721 f.p.s.)

$\therefore m = 53{,}760/11{,}721 = 4.58.$

which given in lbs. = 147.4 lb./sec. The total weight of fuel carried is 8.5 tons (19,040 lbs.), so that the burning period = 19,040/147.4 = 124 secs.

The final velocity using Mr. Burgess's formula is given by :—

$V = (v \log_e 3.42) - gt.$

$= (11{,}721 \times 1.2296) - 4192.$

$= 10{,}220$ f.p.sec. $= (1.93$ m.p.s.)

Using the formula given by Mr. Gatland the final velocity is 14,400 f.p.s. (2.1 m.p.s.).

In the above calculations it will be seen that a burning period of 124 seconds is attained. Mr. Burgess puts the burning period at "Under 60 seconds," the actual time he uses in his calculatilns is 46 seconds.

Using the formula $Rt = Mv$, where t is the time period of one second, and m is the mass burnt per second. This formula is for a rocket without aspiration of air. I fail to see where this figure of 46 seconds enters into the calculations, and assume that it is obtained from Mr. F. C. Sheffield's article published in *Flight*, December 21st, 1944, where he states the burning period of the V2 is around 60 seconds.

I do not think it will be possible at present to build a rocket with the requisite mass ratio of propellant to rocket structure with the materials and fuels at present available for a flight to the moon; but there is no doubt that this will be accomplished during the next few years. I am certain that even though the German V2 has made a big step forward in rocket propulsion, the British Astronautical and Interplanetary Societies will be able to take the lead in technical developments, and lead the world with reaction units.

L. SYKES.

WITH THE EIGHTH: Four R.A.F. airmen repair an Auster IV, hit while artillery-spotting over the Eighth Army front.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements

Promotions

Wing Cdrs. (temp. or War Sub. Air Comdres.) to be Group Captains.

GENERAL DUTIES BRANCH.

C. A. BOUCHIER, C.B.E., D.F.C.
G. S. HODSON, C.B.E., A.F.C. (Act. Air Vice-Marshal).
L. F. PENDRED, M.B.E., D.F.C.
B. E. EMBRY, D.S.O., A.F.C.
H. A. HAINES, C.B.E., D.F.C.
J. N. BOOTHMAN, C.B., D.F.C., A.F.C.
R. L. RAGG, A.F.C.
F. F. INGLIS, C.B.E. (Act. Air Vice-Marshal).
W. L. DAWSON, C.B.E.
G. HARCOURT-SMITH, C.B.E., M.V.O., (Act. Air Vice-Marshal).
G. H. MILLS, D.F.C.
H. BROADHURST, C.B., D.S.O., D.F.C., A.F.C. (Act. Air Vice-Marshal).
E. D. H. DAVIES.
J. L. KIRBY, C.B.E.
H. F. V. BATTLE, O.B.E., D.F.C.
A. R. WARDLE, A.F.C.
F. L. PEARCE, D.S.O., D.F.C.
F. W. LONG.
J. D. I. HARDMAN O.B.E., D.F.C.
G. P. H. CARTER.
A. HESKETH, C.B.E., D.F.C.
C. E. N. GUEST, C.B.E.
W. A. D. BROOK, C.B.E.
N. H. D'AETH, C.B.E.
C. B. R. PELLY, C.B.E., M.C.
R. S. BLUCKE, D.S.O., A.F.C.
D. A. BOYLE, A.F.C.
G. R. BEAMISH, C.B., C.B.E.
A. C. H. SHARP, D.S.O. (Act. Air Vice-Marshal).

TECHNICAL BRANCH.

H. E. FORROW, O.B.E.
K. L. BOSWELL, C.B.E.
T. A. WARNE-BROWN, C.B.E., D.S.C.
R. O. JONES, C.B., A.F.C. (Act. Air Vice-Marshal).
F. E. VERNON, O.B.E.
D. W. CLAPPEN.
E. B. ADDISON, C.B.E. (Act. Air Vice-Marshal).
R. G. HART, C.B.E., M.C.
L. DALTON-MORRIS, C.B.E.

Appointments

THE Air Ministry announces the following appointments:—

Air Vice-Marshal D. COLYER, C.B., D.F.C., to be head of the R.A.F. Delegation, Washington, and to be Air Marshal.

Act. Air Marshal W. A. CORYTON, C.B., M.V.O., D.F.C., to be Air Marshal Commanding, Bengal and Burma.

Air Vice-Marshal W. F. DICKSON, D.S.O., O.B.E., A.F.C., to be Assistant Chief of Air Staff (Policy), Air Ministry.

Air Vice-Marshal J. W. BAKER, C.B., M.C., D.F.C., to be A.O.C. of a group in Fighter Command.

Act. Air Vice-Marshal C. A. STEVENS, M.C., to be Air Officer in charge of Administration, Bengal and Burma.

Act. Air Vice-Marshal G. E. GIBBS, M.C., to be Senior Air Staff Officer, Bengal and Burma.

Act. Air Vice-Marshal R. M. FOSTER, C.B.E., D.F.C., to be A.O.C. Desert Force, M.A.A.F.

Awards

Fleet Air Arm

THE KING has been graciously pleased to give orders for the following appointment to the Most Excellent Order of the British Empire:—

Group Capt E. R. C. Nanson, C.B.E., D.S.C., A.F.C., who recently retired from the R.A.F. He has been Inspector of Recruiting since 1939.

Temp. Act. Sub. Lt. (A) G. MAIR, R.N.V.R.—For courage and skill in successfully landing an aircraft under very difficult conditions, thereby saving the life of his crew and a valuable machine.

Royal Air Force

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy:—

Distinguished Service Order

Capt. H. A. S. RINK, S.A.A.F., No. 24 (S.A.A.F.) Sqn.—This officer has completed a very large number of sorties, involving attacks against a wide variety of targets, ranging from the early battle zones in East Africa and the Western Desert to the fighting in Italy. He is an observer of the highest order, whose great skill, cool courage and iron determination have impressed all. In attacks on railway sidings and installations, Capt. Rink's accurate bombing has caused much loss to the enemy. His operational record is outstanding.

Act. Sqn. Ldr. G. W. O'DONOVAN, R.A.F.V.R., No. 582 Sqn.—In October, 1944, this officer was pilot and captain of one of a bomber force detailed to attack the Walcheren sea wall. In the operation he displayed the highest standard of courage and pressed home his attack with great skill and precision. Sqn. Ldr. O'Donovan has completed a very large number of sorties, involving attacks on a wide range of targets, including such heavily defended areas as Berlin, Stuttgart, Stettin and Kiel.

Flt. Lt. G. A. MARTIN, D.F.C., R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.—This officer was air bomber in an aircraft detailed to attack Dusseldorf one night in November, 1944. When nearing the target, the aircraft was hit by shrapnel and the pilot was seriously wounded. With the assistance of another member of the crew, Flt. Lt. Martin removed his stricken comrade from the pilot's seat and afterwards took over the controls. Flt. Lt. Martin regained altitude and went on to release the bombs over the target area. He afterwards flew the damaged aircraft to this country and effected a successful crash-landing at the nearest available airfield. This officer displayed the highest standard of courage and determination and, though not so experienced as the regular pilot, was undoubtedly responsible for the safe return of the aircraft and its crew.

Act. Wing Cdr. J. H. HOSKINS, D.F.C., R.A.F.V.R., No. 221 Sqn.—Wing Cdr. Hoskins has commanded his squadron since January, 1944, and has fulfilled his arduous duties with great energy and enthusiasm. He has personally completed three tours of operational duty. His sorties have included many anti-submarine patrols, reconnaissances and shipping for escorts in the Mediterranean theatre of war. On one occasion recently he obtained hits on a 1,500-ton motor

SERVICE AVIATION

vessel and an 80-ton barge. Under his leadership the squadron has become a highly efficient fighting unit which has attained a remarkable measure of success in all its operations.

Act. Wing Cdr. A. G. PAGE, D.F.C., R.A.F.V.R.—Since the award of a bar to the D.F.C., this officer has operated most successfully as wing commander (operations) with his wing during the campaign in France. In this period he has destroyed three enemy aircraft and damaged others, apart from causing much damage to enemy fighting and transport vehicles. On two occasions in July, 1944, while on a cannon test, he encountered upwards of 30 aircraft. Each time, he attacked without hesitation and shot down one of the enemy. On the second occasion he was wounded by a cannon shell, but flew safely to base. Later in October, 1944, he sustained severe injuries, when his aircraft crashed after being damaged by anti-aircraft fire. Apart from his individual exploits, Wing Cdr. Page has infused the entire wing with his own fighting spirit. Under his command 60 enemy aircraft have been destroyed together with a large number of transport vehicles and tanks. This splendid achievement has been largely due to the brilliant leadership of Wing Cdr. Page.

Act. Sqn. Ldr. G. B. JOHNS, D.F.C., R.A.F., No. 260 Sqn.—This officer has a fine record of operational flying, which has included sorties from France, England, Malta and the Western Desert, Sicily and Italy. He has achieved most satisfactory results against many heavily defended targets, especially while operating in close support of the Army. Now on his fourth operational tour, Sqn. Ldr. Johns has commanded two squadrons, both of which, through his careful training, have attained a high reputation for discipline and efficiency. Both in the air and on the ground, this officer has set an example of the highest order by his fine fighting spirit, splendid leadership and enthusiasm.

Act. Sqn. Ldr. H. E. TURNER, D.F.C., R.A.F.V.R., No. 104 Sqn.—During his period of duty as squadron commander, this officer has materially contributed, by his outstanding initiative and ability, to the many successes achieved. Under his leadership a wide variety of targets have been attacked from Tunisia and Italy and he has personally participated in operations directed against railway sidings at Sofia, the Manfred Weiss armament works at Budapest and the dock areas at Marseilles. On one occasion in May, 1944, he attacked an important railway bridge at Turnu Severin in Rumania on two consecutive nights, returning a second time to make certain of success. In July, 1944, he remained for ten minutes over an enemy airfield near Vienna in bright moonlight before being able to locate, bomb and photograph his target. During the whole of this time his aircraft was subjected to intense anti-aircraft fire. By such acts of gallantry Sqn. Ldr Turner has aroused an exceptional spirit of enthusiasm and determination amongst those under his command, while his remarkable powers of organisation and leadership have been reflected in the high standard of serviceability and general operational efficiency of his squadron.

Act. Flt. Lt. R. H. PITMAN, R.A.F.V.R., No. 39 Sqn.—This officer, a deputy flight commander, has almost completed his second tour of operational duty. He has taken part in many anti-shipping sorties, mine-laying operations and convoy escorts and has obtained torpedo hits on four large enemy vessels, all of which were sunk. On convoy and intruder patrols he has been equally successful. In February, 1944, he took a successful part in the frustration of a determined attack by 50 enemy aircraft, on an important convoy off North Africa. His most recent success was his outstanding leadership of the formation which finally crippled the 48,000-ton Italian liner *Rex*. On no less than 19 occasions this officer has flown back to base in damaged aircraft. He is a cool and competent leader whose courage and devotion to duty have been worthy of the highest praise.

Act. Sqn. Ldr. J. H. TROBE, D.F.C., R.A.A.F., No. 10 (R.A.A.F.) Sqn.

Correction

January 18th, 1945.

Owing to an error in the official citation, it is regretted that the name of Act. Sqn. Ldr. J. R. Collier, D.S.O., D.F.C., was spelt as Collier, under the heading, "Distinguished Service Order."

Bar to Distinguished Flying Cross

Act. Sqn. Ldr. R. W. L. MULLINER, D.F.C., R.A.F.V.R., No. 183 Sqn.—Since being awarded the D.F.C., this officer has participated in numerous sorties, involving attacks on various targets in the battle area. In November, 1944, he led the squadron in a sortie in support of our ground forces invading Walcheren. The task on hand was to silence enemy guns. The weather was bad. In spite of this, the enemy's positions were subjected to a fierce attack. The guns were silenced and thus the hazards confronting our troops were greatly reduced. In this well-executed and spirited action, Sqn. Ldr. Mulliner displayed inspiring leadership, great courage and determination.

Flt. Lt. G. A. H. FIELD, D.F.C., R.N.Z.A.F., No. 226 Sqn.—These officers were navigator and pilot respectively of the leading aircraft of a formation detailed to attack a road-rail bridge in the Venlo area. The target was vital to the enemy and was very heavily defended. In the run-in, intense and accurate anti-aircraft fire was encountered. The aircraft was hit. A piece of shrapnel tore through Flt. Lt. Field's compartment, narrowly missing him. In spite of this, he coolly and skilfully directed the run-in. Displaying the greatest determination, P/O. Sims maintained a steady course to make an excellent bombing run. The target was attacked with great precision and several hits were obtained. The success achieved reflects the greatest credit on the efforts of these officers, who set a fine example of skill, courage and devotion to duty.

Sqn. Ldr. W. A. OLMSTED, D.F.C., R.C.A.F., No. 416 (R.C.A.F.) Sqn.—Since the award of the D.F.C., Sqn. Ldr. Olmsted has destroyed a further 80 mechanical vehicles. In addition he has repeatedly attacked enemy locomotives in a most heavily defended area in the outskirts of the Ruhr, severely damaging 27 vehicles and a large number of goods trucks. In September, 1944, a very large amount of enemy equipment was destroyed or damaged. Sqn. Ldr. Olmsted has always displayed magnificent leadership and a fine fighting spirit which are worthy of high praise.

F/O. D. W. GOODWIN, D.F.C., R.C.A.F., No. 442 (R.C.A.F.) Sqn.—Since the award of the D.F.C., this officer has flown on many operational sorties. In October, 1944, he led a formation of aircraft against a far larger number of enemy aircraft and, in the ensuing engagement, at least three of the enemy force were destroyed and others damaged. F/O. Goodwin destroyed one enemy fighter himself, bringing his total victories to two enemy aircraft destroyed. In addition he has inflicted considerable damage on the enemy's mechanical transport and destroyed a complete ammunition train. This officer has always pressed home his attacks with great determination and, by his fine leadership and exceptional keenness, he has set an inspiring example to the other members of his squadron.

F/O. D. R. C. JAMIESON, D.F.C., R.C.A.F., No. 412 (R.C.A.F.) Sqn.—Since the award of the D.F.C., F/O. Jamieson has taken part in many more operational sorties. During the period of the Arnhem paratroop landings and subsequent critical days, his fine fighting spirit, courage and initiative added much to the splendid effort put up by his squadron. On one occasion he was engaged in air combat with a far superior number of enemy aircraft. Displaying superb airmanship, F/O. Jamieson destroyed at least two of the enemy fighters without sustaining any damage to his own aircraft. Under his able leadership, his flight has destroyed or damaged a large number of enemy vehicles. This officer has himself accounted for 47 vehicles, two locomotives and at least three enemy aircraft.

Maj. J. F. O. DAVIS, D.F.C., S.A.A.F., No. 12 (S.A.A.F.) Sqn.—Since the award of the D.F.C., Maj. Davis has continued to display great courage and unflinching devotion to duty on a large number of operational sorties. In June, 1944, he pressed home an attack on Candia Harbour in the face of very intense and accurate anti-aircraft fire, obtaining hits on the quays and harbour installations. In August, 1944, Maj. Davis led a formation of Marauders to attack an important rail-road bridge at Cavarzere. Despite bad weather, he operated with such skill that, as a result of this attack, the whole bridge collapsed. On many occasions this officer has led attacks on enemy positions in support of the army; on one such sortie severe damage was caused to his aircraft. His leadership has been of the highest order throughout.

Act. Maj. J. H. HAARHOFF, D.F.C., S.A.A.F., No. 12 (S.A.A.F.) Sqn.—Maj. Haarhoff has proved himself a pilot of exceptional ability. Since being awarded the D.F.C. he has secured an outstanding measure of success against railway targets in Central and Northern Italy. In July, 1944, he led a formation to attack an enemy stores depot west of Florence. Throughout the attack, heavy and accurate anti-aircraft fire necessitated violent evasive action, but, despite this, the mission was successfully completed. Maj. Haarhoff's brilliant leadership on this occasion enabled the formation to attain its objective and avoid serious losses.

Distinguished Flying Cross

Act. Wing Cdr. J. C. W. GOLDTHORP, R.A.F.V.R., No. 225 Sqn.
Act. Wing Cdr. P. W. STANSFELD, R.A.F.
Sqn. Ldr. L. J. ANDERSON, R.A.F., No. 114 Sqn.
Act. Sqn. Ldr. P. L. BURKE, A.F.C., R.A.F.O., No. 600 Sqn.
Act. Sqn. Ldr. E. M. GRIFFITH, R.A.F.V.R., No. 69 Sqn.
Act. Sqn. Ldr. D. P. JENKINS, R.A.F.V.R., No. 257 Sqn.
Act. Sqn. Ldr. C. D. N. LONGLEY (since deceased), R.A.F.V.R., No. 140 Sqn.
Act. Sqn. Ldr. R. M. MUMFORD, R.A.F.V.R., No. 256 Sqn.
Act. Sqn. Ldr. G. M. SMITH, R.A.F., No. 256 Sqn.
Flt. Lt. A. C. BLYTHE, R.A.F.V.R., No. 437 Sqn.
Flt. Lt. K. E. R. BOOTH, R.A.F.V.R., No. 613 Sqn.
Flt. Lt. G. H. BRIGGS, R.A.F.V.R., No. 107 Sqn.
Flt. Lt. P. I. BURDEN, R.A.F.V.R., No. 233 Sqn.
Flt. Lt. C. G. CHADWICK, R.A.F.V.R., No. 140 Sqn.
Flt. Lt. W. T. CUNNINGHAM, R.A.F.V.R., No. 253 Sqn.
Flt. Lt. R. G. ELVIN, R.A.F.V.R., No. 613 Sqn.
Flt. Lt. P. FURNISS, R.A.F., No. 154 Sqn.
Flt. Lt. T. GRACE, R.A.F.V.R., No. 272 Sqn.
Flt. Lt. J. P. HART, R.A.F.V.R., No. 613 Sqn.
Flt. Lt. P. I. HART, R.A.F.V.R., No. 140 Sqn.
Flt. Lt. F. J. HOPE, R.A.F.V.R., No. 2 Sqn.
Flt. Lt. R. E. KNIGHT, R.A.F., No. 613 Sqn.
Flt. Lt. J. F. OVERTON, R.A.F., No. 613 Sqn.
Flt. Lt. E. RAYNER, R.A.F.V.R., No. 613 Sqn.
Flt. Lt. N. M. REDINGTON, R.A.F.V.R., No. 21 Sqn.
Flt. Lt. S. T. SITWELL, R.A.F., No. 613 Sqn.
Flt. Lt. A. P. SKINNER, R.A.F., No. 242 Sqn.
Flt. Lt. E. SWAINE, R.A.F.V.R., No. 21 Sqn.
Flt. Lt. A. G. WILLERS, R.A.F.V.R., No. 21 Sqn.
Flt. Lt. K. P. WINDER, R.A.F., No. 21 Sqn.
Flt. Lt. L. E. S. WHALEY, R.A.F.V.R., No. 600 Sqn.
Act. Flt. Lt. P. W. GILPIN, R.A.F.V.R., No. 253 Sqn.
Flt. Lt. D. SWALE, R.A.F.V.R., No. 107 Sqn.
Flt. Lt. T. C. THOMAS, R.A.F.V.R., No. 226 Sqn.
Flt. Lt. H. WIGLEY, R.A.F.V.R., No. 69 Sqn.
Act. Flt. Lt. E. W. HARBUTT, R.A.F.V.R., No. 183 Sqn.
Act. Flt. Lt. D. R. IBBOTSON, R.A.F.V.R., No. 256 Sqn.
Act. Flt. Lt. I. M. PEARSON, R.A.F.V.R., No. 7 Sqn. (since deceased).
Act. Flt. Lt. P. B. STEWART, R.A.F.V.R., No. 8 Sqn.
F/O. G. BEAUMONT, R.A.F.V.R., No. 600 Sqn.
F/O. W. J. BODINGTON, R.A.F., No. 613 Sqn.
F/O. M. G. CROTTY, R.A.F.V.R., No. 140 Sqn.
F/O. P. W. ELLIS, R.A.F.V.R., No. 150 Sqn.
F/O. W. D. EVANS, R.A.F.V.R., No. 98 Sqn.
F/O. A. E. D. EYLES, R.A.F.V.R., No. 613 Sqn.
F/O. N. L. GILSON, R.A.F.V.R., No. 107 Sqn.
F/O. J. F. GRIEVE, R.A.F.V.R., No. 142 Sqn.
F/O. R. HARPIN, R.A.F.V.R.
F/O. F. W. W. HAWARD, R.A.F.V.R., No. 683 Sqn.
F/O. C. B. KENWORTHY, R.A.F.V.R., No. 21 Sqn.
F/O. G. H. G. LATT, R.A.F.V.R., No. 21 Sqn.
F/O. W. LE MAY, R.A.F.V.R., No. 140 Sqn
F/O. A. T. LEMON, R.A.F.V.R., No. 140 Sqn

JUNGLE AMBULANCE : American Sentinels are being used to evacuate casualties from forward positions in the Burma jungle.

F/O. D. J. P. MATTHEWS, R.A.F.V.R., No. 154 Sqn.
F/O. C. C. REEDER, R.A.F.V.R., No. 66 Sqn.
F/O. E. R. MORGAN, R.A.F.V.R., No. 242 Sqn.
F/O. H. PILMINGTON, R.A.F.V.R., No. 21 Sqn.
F/O. L. PLOWS, R.A.F.V.R., No. 164 Sqn.
F/O. E. T. RUCK, R.A.F.V.R., No. 31 (S.A.A.F.) Sqn.
F/O. H. D. RUSSELL, R.A.F.V.R., No. 272 Sqn.
F/O. S. B. SPRING, R.A.F.V.R., No. 16 (S.A.A.F.) Sqn.
F/O. A. K. STRUDWICK, R.A.F., No. 613 Sqn.
F/O. D. G. TONGUE, R.A.F.V.R., No. 410 (R.C.A.F.) Sqn.
F/O. C. N. WALLEY, R.A.F.V.R.
F/O. D. M. WHITE, R.A.F.V.R., No. 150 Sqn.
F/O. M. A. WINGHAM, R.A.F.V.R., No. 255 Sqn.
P/O. D. BROWN, R.A.F.V.R., No. 148 Sqn.
P/O. V. M. COLLINS, R.A.F.V.R., No. 107 Sqn.
P/O. P. E. FAHY, R.A.F.V.R., No. 16 Sqn.
P/O. A. R. HALLETT, R.A.F.V.R., No. 16 Sqn.
P/O. A. HALLIDAY, R.A.F.V.R., No. 21 Sqn.
P/O. I. M. JONES, R.A.F.V.R., No. 150 Sqn.
P/O. D. REPMAN, R.A.F.V.R., No. 156 Sqn.
P/O. J. W. VICK, R.A.F., No. 613 Sqn.
W/O. B. NICHOLLS, R.A.F.V.R., No. 256 Sqn.
W/O. L. SHAW, R.A.F.V.R., No. 272 Sqn.
W/O. J. L. WATTS, R.A.F.V.R., No. 613 Sqn.
Flt. Lt. J. W. ANDERSON, R.A.A.F., No. 142 Sqn.
Flt. Lt. L. J. CLARKE, R.A.A.F., No. 142 Sqn.
Flt. Lt. W. E. GOLDMAN, R.A.A.F., No. 450 (R.A.A.F.) Sqn.
Flt. Lt. J. H. MAXWELL, R.A.A.F., No. 242 Sqn.
Flt. Lt. M. T. MURPHY, R.A.A.F., No. 16 (S.A.A.F.) Sqn.
Act. Flt. Lt. D. S. EDEN, R.A.A.F., No. 150 Sqn.
Act. Flt. Lt. V. T. SKEHILL, R.A.A.F., No. 150 Sqn.
F/O. A. F. GOODALL, R.A.A.F., No. 150 Sqn.
F/O. D. W. MCNEIL, R.A.A.F., No. 13 Sqn.
P/O. J. L. PENNEFATHER, R.A.A.F., No. 142 Sqn.
W/O. M. G. JORDAN, R.A.A.F., No. 150 Sqn.
Sqn. Ldr. W. M. FOSTER, R.C.A.F., No. 66 Sqn.
Act. Sqn. Ldr. E. G. LAPP, R.C.A.F., No. 411 (R.C.A.F.) Sqn.
Act. Sqn. Ldr. E. A. MONSON, R.C.A.F., No. 439 (R.C.A.F.) Sqn.
Act. Sqn. Ldr. A. H. SAGER, R.C.A.F., No. 443 (R.C.A.F.) Sqn.
Act. Sqn. Ldr. E. P. WOOD, R.C.A.F., No. 403 (R.C.A.F.) Sqn.
Flt. Lt. J. McD. BALLACHEY, R.C.A.F., No. 107 Sqn.
Flt. Lt. C. W. FOX, R.C.A.F., No. 412 (R.C.A.F.) Sqn.
Flt. Lt. P. L. GIBBS, R.C.A.F., No. 66 Sqn.
Flt. Lt. D. W. A. HARLING, R.C.A.F., No. 416 (R.C.A.F.) Sqn.
Flt. Lt. J. McLURG, R.C.A.F., No. 107 Sqn.
Flt. Lt. H. J. NIXON, R.C.A.F., No. 411 (R.C.A.F.) Sqn.
Flt. Lt. J. D. ORR, R.C.A.F., No. 403 (R.C.A.F.) Sqn.
Flt. Lt. W. B. PEGLAR, R.C.A.F., No. 274 Sqn.
Flt. Lt. D. B. RODD, R.C.A.F., No. 150 Sqn.
Flt. Lt. N. G. RUSSELL, R.C.A.F., No. 416 (R.C.A.F.) Sqn.
Flt. Lt. G. M. SMITH, R.C.A.F., No. 421 (R.C.A.F.) Sqn.
Flt. Lt. B. WARREN, R.C.A.F., No. 66 Sqn.
Flt. Lt. D. WARREN, R.C.A.F., No. 66 Sqn.
Act. Flt. Lt. W. D. BURTON, R.C.A.F., No. 439 (R.C.A.F.) Sqn.
Act. Flt. Lt. R. E. EVANS, R.C.A.F., No. 417 (R.C.A.F.) Sqn.
F/O. W. K. CARR, R.C.A.F.
F/O. W. F. COOK, R.C.A.F., No. 421 (R.C.A.F.) Sqn.
F/O. D. H. KIMBALL, R.C.A.F., No. 441 (R.C.A.F.) Sqn.
F/O. J. P. LUMSDEN, R.C.A.F., No. 422 (R.C.A.F.) Sqn.
F/O. H. F. MORSE, R.C.A.F., No. 422 (R.C.A.F.) Sqn.
F/O. G. F. OCKENDEN, R.C.A.F., No. 443 Sqn.
F/O. P. SLAYDEN, R.C.A.F., No. 107 Sqn.
F/O. W. R. WEEKS, R.C.A.F., No. 422 (R.C.A.F.) Sqn.
P/O. J. A. KERR, R.C.A.F., No. 411 (R.C.A.F.) Sqn.
Flt. Lt. R. BATENBURG, R.N.Z.A.F., No. 140 Sqn.
Flt. Lt. E. L. GRAY, R.N.Z.A.F., No. 140 Sqn.

SERVICE AVIATION

Flt. Lt. W. C. HENDERSON, R.N.Z.A.F., No. 464 (R.A.A.F.) Sqn.
Act. Flt. Lt. L. S. McQ. WHITE, R.N.Z.A.F., No. 485 (N.Z.) Sqn.
Flt. Lt. J. F. P. YEATMAN, R.N.Z.A.F., No. 485 (N.Z.) Sqn.
F/O. R. B. HENDRY, R.N.Z.A.F., No. 72 Sqn.
F/O. C. S. MARTIN, R.N.Z.A.F., No. 21 Sqn.
F/O. H. H. S. MOORE, R.N.Z.A.F., No. 242 Sqn.
W/O. R. J. HAWKE, R.N.Z.A.F., No. 464 (R.A.A.F.) Sqn.
Maj. C. F. GEERE, S.A.A.F., No. 19 (S.A.A.F.) Sqn.
Maj. W. M. LANGERMAN, S.A.A.F., No. 243 Sqn.
Maj. E. J. MACDONALD, S.A.A.F., No. 142 Sqn.
Capt. V. P. COURT, S.A.A.F., No. 24 (S.A.A.F.) Sqn.
Capt. O. C. ELLIOTT, S.A.A.F., No. 21 (S.A.A.F.) Sqn.
Capt. C. M. W. HARLEY, S.A.A.F., No. 60 (S.A.A.F.) Sqn.
Capt. C. R. HARRISON, S.A.A.F., No. 16 (S.A.A.F.) Sqn.
Capt. T. A. HUNT, S.A.A.F., No. 107 Sqn.
Capt. E. R. LARTER, A.F.C., S.A.A.F., No. 60 (S.A.A.F.) Sqn.
Lt. P. A. J. KANVAL-AIME, S.A.A.F., No. 40 (S.A.A.F.) Sqn.
Lt. A. V. PEARSON, S.A.A.F., No. 24 (S.A.A.F.) Sqn.
Lt. J. R. D. STRANGE, S.A.A.F., No. 16 (S.A.A.F.) Sqn.
Lt. J. H. P. VAN ROOYEN, S.A.A.F., No. 60 (S.A.A.F.) Sqn.
Lt. H. C. WHEELER, S.A.A.F., No. 12 (S.A.A.F.) Sqn.
Lt. J. C. WHITE, S.A.A.F., No. 17 (S.A.A.F.) Sqn.
2/Lt. J. BURDEKIN, S.A.A.F., No. 12 (S.A.A.F.) Sqn.
2/Lt. W. H. TURNER, S.A.A.F., No. 12 (S.A.A.F.) Sqn.
Act. Flt. Lt. J. E. MCALLISTER, R.C.A.F., No. 415 (R.C.A.F.) Sqn.
Act. Flt. Lt. J. W. STRATTON, R.A.F.V.R., No. 622 Sqn.
Act. F/O. J. T. BARLOW, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
P/O. G. N. SIMS, R.A.F.V.R., No. 226 Sqn.—For citation see Flt. Lt. G. A. H. Field, D.F.C.
F/O. R. M. FLEMING, R.C.A.F., No. 415 Sqn.
F/O. H. KNOBOVITCH, R.C.A.F. No. 415 (R.C.A.F.) Sqn.
F/O. J. A. SMITH, R.A.A.F., No. 608 Sqn.
F/O. J. A. WEIR, R.C.A.F., No. 415 (R.C.A.F.) Sqn.
P/O. G. W. FERNYHOUGH, R.A.F.V.R., No. 10 Sqn.
Group Capt. P. HAYNES, R.A.F.
Flt. Lt. J. R. BARTHOLOMEW, R.A.F.V.R., No. 608 Sqn.
F/O. M. WATKINS, R.A.F.V.R., No. 608 Sqn.
P/O. F. D. CRONEY, R.A.F.V.R., No. 582 Sqn.
P/O. G. H. HUNT, R.A.A.F., No. 582 Sqn.
Flt. Lt. R. H. BURDEN, R.A.A.F., No. 450 (R.A.A.F.) Sqn.
Flt. Lt. A. H. COMFORT, R.A.F.V.R., No. 524 Sqn
F/O. G. EYRE, R.A.F.V.R., No. 425 Sqn.
F/O D. T. IBBOTSON, R.A.A.F., No. 44 Sqn.
F/O. H. H. LAWRENCE, R.A.F.V.R., No. 102 Sqn.
F/O. E. ONIONS, R.A.F.V.R., No. 578 Sqn.
Flt. Lt. T. P. MCELHANNEY, R.C.A.F., No. 417 (R.C.A.F.) Sqn.

Distinguished Flying Medal

Flt. Sgt. H. R. TROTTER, R.A.F.V.R., No. 613 Sqn.
Flt. Sgt. N. WINT, R.A.F.V.R., No. 600 Sqn.
Sgt. R. CLIVE-GRIFFIN, R.A.F.V.R., No. 150 Sqn
Sgt. J. DENNISON, R.A.F.V.R., No. 69 Sqn.
Sgt. C. D. T. MANSFIELD, R.A.F.V.R., No 150 Sqn.
Flt. Sgt. (now P/O.) J. H. CARTER, R.A.A.F., No. 464 (R.A.A.F.) Sqn.
Flt. Sgt. S. JEACOCKE, R.A.A.F., No 150 Sqn.
Flt. Sgt. (now P/O.) R. S. SEAMAN, R.A.A.F., No. 464 (R.A.A.F.) Sqn.
Flt. Sgt. (now P/O.) M. E. GILMORE, No. 420 (R.C.A.F.) Sqn.

THE KING has been graciously pleased to approve the following awards:—

O.B.E. (Mil.)

Maj. C. F. GEER, S.A.A.F., No. 19 (S.A.A.F.) Sqn.—In August, 1944, Maj. Geer was giving dual instruction in an aircraft when it crashed, broke in two, and burst into flames. Although injured, Maj. Geer was able to extricate himself from the wreckage, but soon realised that his pupil had not got free. Despite exploding ammunition, and well knowing that the petrol tanks might blow up at any minute, this officer re-entered the blazing fuselage, unfastened his companion's harness and took him to safety. In the process, Maj. Geer sustained burns on the face and arms, but his prompt and courageous action saved the pupil's life.

M.B.E. (Mil.)

Flt. Lt. G. M. CARMICHAEL, R.A.F., att. No. 451 (R.A.A.F.) Sqn.
Capt. J. MORPHEW, S.A.A.F., No. 4 Sqn.
F/O. F. H. GREENAWAY, R.N.Z.A.F., No. 21 Sqn

George Medal

Act. Wing Cdr. J. N. DAVENPORT, D.S.O., D.F.C., R.A.A.F., No. 455 (R.A.A.F.) Sqn.—One evening in September, 1944, a Beaufighter aircraft, returning from operations with damaged engines, crashed on a runway. The petrol tanks burst and the aircraft became a mass of flames, with bursting cannon shells and ammunition. Wing Cdr. Davenport, having witnessed the crash, hastened to the scene in his car, leading the ambulance and fire tender. While attempting to subdue the flames with their hoses, the fire crew were forced back by the heat and exploding ammunition. The observer in the aircraft was able to open his hatch and escape by jumping through the fire, but the pilot's cockpit was completely surrounded by flames. His cockpit hatch was seen to open partially and fell shut again. Wing Cdr. Davenport immediately dashed forward, opened the pilot's top hatch, and struggled to free him. The pilot was severely burned and his feet were jammed. Wing Cdr. Davenport pulled him out of his flying boots and lifted him bodily through the blazing inferno to safety. Wing Cdr. Davenport sustained shock, with burns to his face, hair and hands. By his prompt and most courageous action he saved the pilot's life.

Flt. Sgt. T. E. HOLMES, No. 455 (R.A.A.F.) Sqn.—One night in May, 1944, Flt. Sgt. Holmes was observer in a Beaufighter aircraft detailed for bombing practice. Soon after the take off one engine failed, and, when a forced landing was attempted at a nearby airfield, the aircraft crashed in a wood and burst into flames. Flt. Sgt. Holmes was burnt about the face and his harness was on fire before he was able to fight his way out of his compartment. Trees had fallen over the aircraft and were blazing furiously. The airman climbed first along the port side and then along the starboard side of the aircraft in an attempt to rescue his pilot, but was prevented from doing so by the burning trees and the fire in the aircraft. Flt. Sgt. Holmes then forced his way through the woods to the front of the Beaufighter, but again was unable to get to his companion because of the dense and blazing undergrowth. This airman displayed great courage and persistence in his gallant attempt to rescue the pilot in the face of exploding cannon shells, practice bombs and petrol tanks which had been torn from the aircraft and were blazing nearby. In August, 1944, Flt. Sgt. Holmes was again involved in a crash of another aircraft in which he was flying as observer. Despite severe cuts to his head and face he quickly left his compartment, climbed up the wing of the blazing aircraft, and helped his pilot from the cockpit, thereby enabling him to escape with only minor burns.

B.E.M. (Mil.)

Flt. Sgt. L. J. S. SPICER, R.A.F.V.R.—In July, 1944, Flt. Sgt. Spicer was the observer of a Beaufighter aircraft which, owing to engine failure,

IN ALL WEATHERS: A Bobcat of U.S. Air Transport Command prepares to take off from an American airfield in Southern England during a snowstorm.

SERVICE AVIATION

crashed into some high tension cables shortly after taking off for a training flight. The aircraft burst into flames on reaching the ground. Flt. Sgt. Spicer was uninjured and, smashing his way through the cupola of his cockpit, he quickly got clear of the wreckage. The pilot of the aircraft was seriously injured, and trapped in his cockpit, which was enveloped in flames. Although suffering from shock, Flt. Sgt. Spicer returned to the wreckage and endeavoured to release his companion, but was at first overcome and forced to retire. Despite the intense heat and exploding ammunition he made a second attempt. He went into the wreckage and eventually dragged the pilot out of his cockpit. With the assistance of two women landworkers, who had by this time arrived on the scene, Flt. Sgt. Spicer then managed to carry the pilot away from the crash to safety. In effecting this rescue Flt. Sgt. Spicer sustained first and second degree burns to his head. His courage saved the pilot's life.

Sgt. J. A. BREADNER, R.A.F. (since deceased).—While in charge of a unit which landed in Normandy early on "D"-Day, this airman displayed outstanding courage, coolness and devotion to duty at all times, and was undoubtedly personally responsible for the efficient and successful work of the unit under conditions of exceptional difficulty and danger. This airman was killed on July 27th, 1944, while salvaging a crashed aircraft within range of enemy fire. He had ordered his party to disperse to safety, but continued working himself, with one other airman.

Sgt. F. W. HUTCHINSON, R.A.F.—In July, 1944, a Blenheim aircraft, which was attempting to land, crashed and immediately caught fire. Sgt. Hutchinson, who was in the vicinity of the aircraft, scrambled through the perimeter wire and made his way to the aircraft. The starboard tank and wing were burning furiously. Going to the port side, he observed that one of the occupants (a Belgian officer) was trapped by his foot and unable to free himself. Sgt. Hutchinson succeeded in extricating him and, with the assistance of another airman who had arrived on the scene, the officer was dragged clear of the wreckage. Sgt. Hutchinson then went to the other side of the aircraft in an endeavour to rescue another member of the crew (an R.A.F. officer). The starboard tank and wing were still blazing furiously, and he was driven back by the intense heat. Undeterred, Sgt. Hutchinson, with the aid of a fire extinguisher, enabled two other personnel to enter the wreckage, and they managed to extricate the officer. Sgt. Hutchinson's gallantry and initiative was most praiseworthy, and he was undoubtedly instrumental in saving two lives.

Act. Cpl. A. G. T. HORNBLOW, R.A.F.V.R.—Cpl. Hornblow arrived in France the day after the invasion of Normandy commenced. From the 11th to the 13th of July, 1944, he was on special point duty south west of Caen and, during this time, he was without relief and under heavy shell and mortar fire from the enemy. A nearby slit trench was hit by a shell and two Canadian soldiers were buried. With the assistance of a stretcher bearer Cpl. Hornblow, by digging with his bare hands, succeeded in extricating one soldier. Whilst he was trying to rescue the other soldier another shell hit the trench. Cpl. Hornblow was buried and the soldier in the trench was killed. Throughout, Cpl. Hornblow displayed exceptional courage and devotion to duty.

L.A/C. J. H. MORTLEY, R.A.F.—In February, 1944, a Mitchell aircraft, which was returning from operations with one of its engines on fire, attempted to land at a R.A.F. station. When making the approach the remaining engine failed, and the pilot, in turning to avoid buildings, crashed down a hillside and through a stone wall. The bomber immediately caught fire. The pilot, being unable to escape from the front of the aircraft, had crawled to the tail dome. L.A/C. Mortley immediately entered the flames, disregarding exploding ammunition and pyrotechnics. Seeing the airman in the tail dome, L.A/C. Mortley proceeded to smash the perspex with his bare hands, tearing at it until he had made a hole large enough to pull the airman through to safety. He then went to the front of the bomber to render assistance to the remaining member of the crew. Owing to this airman's prompt action and high courage three of the four crew members were saved.

Foreign Decorations

THE KING has granted unrestricted permission for the wearing of the undermentioned decorations conferred upon the personnel indicated in recognition of valuable services rendered in connection with the war:—

Conferred by the President of the United States of America

Bronze Star Medal

Act. Sqn. Ldr. N. F. MCMICHAEL, R.A.F.V.R.

Soldiers Medal

Cpl. G. CULLEN, R.A.F.

Cpl. T. C. W. LING, R.A.F.V.R.

L.A/C. D. N. GILBERT, R.A.F.V.R.

GUNNERS' GREETING: Men of the R.A.F. Regiment, manning a light A.A. gun on the Burma front, wave a greeting to a low-flying Hurricane returning from patrol.

Roll of Honour

Casualty Communiqué No. 464.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of these, 60 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Flt. Sgt. J. L. Anderson; Flt. Lt. H. W. Baker; W/O. T. R. Benbow; Sgt. W. H. Ellis; P/O. C. J. Fellick; F/O. J. C. C. Garvey; Flt. Lt. A. G. Gibb; Sgt. N. Hainsworth; Sgt. R. T. Hallett; F/O. M. T. Holmes; Sgt. M. Irwin; Sgt. C. S. Keefe; Sgt. G. D. P. Kerton; Sgt. H. Lancaster; F/O. J. P. Mudge; P/O. W. H. Scourfield; Sgt. G. Smart; Sgt. A. J. Smith; F/O. P. M. Todd; Sgt. J. C. Turreff; F/O. J. Wallace; Flt. Sgt. C. A. Williamson; Sgt. K. G. Wynn.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. D. L. Smith.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. A. W. Aitken; P/O. J. Anderson; Sgt. A. V. Baker; Sgt. W. A. J. Baldwin; Flt. Lt. J. Bannon; Sgt. G. Becken; Flt. Lt. G. Belcher; Sgt. W. Bell; Flt. Sgt. E. H. Blanks; F/O. D. E. Blain; F/O. N. H. Bowring; F/O. D. A. Brown; Flt. Lt. R. Cook; Sgt. W. J. Davies; Flt. Sgt. G. A. Davis, D.F.M.; Sgt. H. H. Falls; Sgt. J. A. Gartland; P/O. H. J. Hansell; F/O. N. A. Hattersley; Sgt. C. Healey; Flt. Sgt. C. M. Holder; P/O. G. C. Holland; Sgt. K. Lance; Flt. Sgt. E. J. Lovell; Sgt. T. A. Monk; Flt. Sgt. F. R. Page; Sgt. J. Pallanca; Sgt. J. H. Parrott; Sgt. A. J. Stanton; F/O. E. B. Woolhouse.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. N. N. Brown; F/O. R. F. Clarke; F/O. Lord A. G. M. D. Decies; Sgt. C. F. Gibbs; Sgt. N. L. Ireland; Sgt. J. E. Penfold; P/O. E. J. Sharp; Act. Sqn. Ldr. R. P. Todd, D.F.C., A.F.C.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. R. Oxborrow.

MISSING, BELIEVED KILLED IN ACTION.—F/O. W. Davies; Flt. Sgt. I. A. Lloyd; P/O. L. J. Phipps; Sgt. I. Williams.

MISSING.—P/O. M. T. Ades; Sgt. R. Aitchison; Flt. Sgt. W. H. Aldridge; Sgt. N. McC. Anderson; P/O. G. H. Ardley; Sgt. H. Ashton; Flt. Sgt. R. E. L. Askie; F/O. D. H. Atkinson; P/O. A. Bailes; F/O. D. Baker; Sgt. F. R. W. Baker; Act. Flt. Lt. R. Banks; Sgt. R. G. Barker; Flt. Sgt. J. Beecroft; Flt. Lt. E. Bennett; P/O. D. G. Benning; Flt. Sgt. H. A. Beverton; Act. F/O. J. N. Bischoff; P/O. F. E. Blackman; F/O. J. T. Boundy, D.F.C.; Sgt. F. P. Boyle; Flt. Sgt. B. K. Brown; F/O. E. C. Brown; F/O. J. E. Brown; Sgt. J. G. Brown; F/O. D. L. S. Cameron; Sgt. J. E. Caton; Sgt. K. W. Clarke; Sgt. D. N. Clough; Flt. Sgt. E. J. Coe; Sgt. S. J. Cooke; Flt. Sgt. T. B. Cragg; Act. Wing Cdr. P. B. N. Davis, D.S.O.; Flt. Sgt. P. H. Dexter; Sgt. D. J. Drake; Sgt. W. A. Drewett; F/O. K. Eastwood; Sgt. W. S. Edwards; Sgt. R. G. Evans; Sgt. B. Fagan; F/O. J. Fielden; Sgt. D. T. Forrest; Flt. Sgt. A. C. Freeman; Act. F/O. D. C. Freeman, D.F.C.; Sgt. A. D. Ghisletta; Sgt. G. B. Gibson; Sgt. L. M. Gill; Sgt. C. A. Grant; W/O. A. Green; Sgt. G. V. Greening; Sgt. G. T. Hagues; Sgt. E. Haigh; F/O. M. Hand; Sgt. V. A. Hanmer; F/O. R. H. Hanney; Sgt. J. H. C. Heasman; F/O. H. O. Hollis; Flt. Lt. P. N. Howard; Flt. Lt. G. C. D. Hunter; F/O. H. Johnson; Sgt. L. J. Jones; Sgt. N. Joyce; Sgt. G. A. Keens; Sgt. R. Kelsall; Sgt. S. T. Kerr; F/O. W. Kirkham; Act. Flt. Lt. C. V. Lesueur; Flt. Sgt. L. J. Lewis; F/O. K. M. Liddle; W/O. H. L. Locke; W/O. G. E. Lythgoe; Flt. Sgt. S. G. McLaren; Flt. Sgt. C. Mabbott; F/O. J. P. Manser; Sgt. J. W. Marshall; F/O. F. Marwood; Sgt. M. P. Mary; Flt. Lt. F. Mason; Sgt. S. Minnis; Flt. Sgt. J. W. Morris; F/O. G. R. Munton; Flt. Sgt. A. J. Murphy; Sgt. R. Newboult; F/O. R. A. Newton; Sgt. A. B. O'Connor; F/O. G. W. Owen; Flt. Sgt. L. G. Page; Flt. Lt. D. C. Paterson; Flt. Sgt. J. G. Plested; Sgt. V. G. Price; Sgt. D. W. G. Purse; Flt. Sgt. L. P. Quinn; Flt. Sgt. G. G. Rogers; Sgt. P. A. Rose; Flt. Sgt. H. S. Rosher; Sgt. C. H. Ross; Flt. Lt. J. Russell; Flt. Lt. N. B. Rutherford, A.F.C.; Flt. Sgt. H. R. Scarr; Flt. Sgt. S. C. Skippen; F/O. R. A. B. Sleo; Flt. Sgt. R. W. Small; Sgt. E. J. Smallidon; Sgt. T. J. R. Smith; P/O. F. H. Stanbury; P/O. R. W. Stephens; Flt. Sgt. P. G. Stiefel; F/O. D. S. Thomas; F/O. P. J. Tofield; P/O. D. S. Tointon; Flt. Sgt. W. C. Tompson; F/O. P. W. Tooley; Flt. Sgt. J. E. Tooth; Sgt. B. C. R. Tomlinson; F/O. H. R. Tribbeck; Flt. Sgt. J. A. Truscott; F/O. F. P. Walker; Flt. Sgt. B. A. Watson; Act. Flt. Lt. D. W. Webber; Sgt. R. I. White; Sgt. R. Whittington.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Lt. L. W. H. Coe; P/O. H. C. Waters.

KILLED ON ACTIVE SERVICE.—Flt. Lt. A. A. Bacon; Sgt. D. E. Ell; A/C.2 H. L. Elliott; Sgt. J. Forbes; F/O. J. L. Fox; Sgt. W. Goodbrand; F/O. E. F. H. Haly, D.F.C.; Flt. Sgt. B. J. Hogg; F/O. E. J. Howlett; Sgt. A. H. Humphries; W/O. S. W. Kearey; F/O. O. J. Lander; F/O. G. E. Lumley; Sgt. J. R. McCarthy; Flt. Sgt. R. Sellors; Sgt. A. J. Tucknott; P/O. E. B. H. Wright.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. W. L. Boney; Flt. Sgt. A. J. Campbell; A/C.2 J. S. Commons; Sgt. S. J. McCandless; L.A/C. R. S. Skeen.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—F/O. D. G. Clough; Flt. Sgt. R. Evans.

DIED ON ACTIVE SERVICE.—A/C.1 C. Archer; Cpl. E. Bate; Sgt. J. M. Brodie; L.A/C. B. E. Burrowes; F/O. D. P. Corry; Cpl. W. E. Gill; L.A/C. T. E. H. Graham; Cpl. A. Horsefield; A/C.2 D. C. Jordan; Flt. Sgt. H. L. Mitchell; Cpl. J. A. Mole; Cpl. F. R. Parsons; A/C.2 J. Pollock; A/C.2 C. H. Riman; L.A/C. M. Smyth; Cpl. S. D. Veryard; L.A/C. G. Walker.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. D. C. Ardis; Act. F/O. G. A. Brown; P/O. W. N. Daniel; Flt. Sgt. L. V. Giddings; W/O. J. H. Hedger; F/O. J. R. B. Porter.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. F. C. Clucas; P/O. J. J. Moon.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Act. Flt. Lt. T. D. H. Alford.

WOUNDED OR INJURED IN ACTION.—P/O. G. O. Paton.

MISSING.—W/O. T. W. Coburn; Act. F/O. H. N. Cornish; P/O. R. A. Davis; Flt. Sgt. J. W. Douglas; Act. Flt. Lt. J. E. Goddard; F/O. E. P. J. Gray; F/O. J. R. U. Jamieson; Act. F/O. R. T. Kerwin; W/O. E. J. McGilvray; P/O. H. M. Nottle; Flt. Sgt. G. S. Reader; F/O. A. R. Scanlon; P/O. K. Willett; Flt. Sgt. C. A. Vieritz.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. R. J. Brown; Flt. Sgt. M. B. Waugh.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. A. D. O'Hara; F/O. W. M. Stanley.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Lt. G. F. Cornwell; F/O. E. W. Greenwood; F/O. R. D. Durling; Flt. Lt. R. F. Logie; F/O. D. L. Loveridge.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. C. E. Brandt; P/O. R. H. Davis; Flt. Sgt. R. R. Keeler; F/O. R. H. Tierney.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sqn. Ldr. W. B. Baldwin, D.F.C.; Flt. Sgt. F. T. Cooper; Sgt. R. H. Cowley; W/O. J. W. Dalis; W/O. J. A. Firth; W/O. H. R. Graham; F/O. I. A. Isfeld;

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P/O. N. Kellner; Flt. Sgt. J. P. C. Lapointe; Flt. Sgt. D. W. McInnis; Sgt. D. L. McNichol; F/O. C. L. McPherson; F/O. J. W. O'Hara; P/O. W. Searle; Flt. Sgt. C. W. Snyder; F/O. R. P. Swallow; F/O. C. A. Tindall; W/O. F. R. Vance; F/O. R. A. Wilson.

WOUNDED OR INJURED IN ACTION.—F/O. E. C. L. P. Catellier; F/O. G. E. Smith.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—P/O. G. Churchard.

MISSING.—W/O. T. W. Allen; W/O. E. W. Bancroft; W/O. D. L. Brouse; W/O. J. A. R. Dore; F/O. J. B. Fitzgerald; P/O. R. J. Lamont; F/O. E. E. McCann; F/O. R. J. Matheson; F/O. H. S. Seibold; W/O. W. R. Tait; Flt. Lt. C. H. Taylor; F/O. J. R. Thomas; F/O. W. R. Zeller.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. D. Boyd; F/O. F. D. Jolicoeur; F/O. R. J. Newman; W/O. B. W. Soroski.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. L. G. Boyd; Flt. Sgt. R. W. Calvert.

WOUNDED OR INJURED ON ACTIVE SERVICE.—W/O. E. J. Moody; P/O. R. N. Shearly.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. H. M. Mackay.

MISSING.—Act. F/O. N. R. Overrend.

South African Air Force

KILLED IN ACTION.—Lt. R. H. Field.

MISSING.—Lt. A. J. Bester; W/O. S. J. Brook; 2/Lt. D. C. Dekenah; W/O. N. A. McNamara; 2/Lt. D. Mackenzie; Lt. D. H. Moodie; 2/Lt. J. W. Moor; Capt. R. C. Thompson.

Casualty Communiqué No. 465

Of the names in this list, 68 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. W. R. Addison; P/O. A. H. O. Butler; F/O. W. H. R. A. Coates; Act. Flt. Lt. R. Guthrie; Sgt. C. Hutchinson; Flt. Lt. S. F. Maunder; P/O. C. T. Orme; Flt. Sgt. A. S. Styles.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. C. A. Acombe-Hill; Sgt. C. M. Baldry; Sgt. W. Beach; Sgt. T. Bowden; Sgt. M. A. Brooks; Sgt. L. C. Brown; P/O. J. P. Dalton; Flt. Sgt. K. N. Elkington; Sgt. I. F. Groves; Sgt. J. F. Harmes; Sgt. L. A. Henson; Sgt. A. A. Johnson; Sgt. A. T. Lester; P/O. R. A. Lewis; Sgt. B. G. Martin; Sgt. G. L. Martin; P/O. J. B. O'Brien; P/O. D. Park; P/O. E. H. Patrick; Sgt. K. G. Plummer; Flt. Sgt. K. B. Renelt; Sgt. G. C. Sage; P/O. E. H. Tansley; Flt. Sgt. J. W. Thompson; P/O. H. Tiller; Sgt. E. C. Toms; Sgt. F. A. Viner; F/O. P. A. Watts; F/O. A. Weldon, D.F.M.; Sgt. J. R. Wilson

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. B. V. Arney; Flt. Sgt. P. W. Templer; Sgt. N. A. Thomas.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. K. Crowther; Sgt. H. Hammond; Flt. Sgt. F. H. Humphrey.

MISSING, BELIEVED KILLED IN ACTION.—F/O. J. M. Dixon; Sgt. R. Hughes; Sgt. L. Hunter; Sqn. Ldr. K. A. Wigglesworth, D.F.C.; Sgt. H. Wright.

MISSING.—P/O. G. V. Acheson; F/O. A. F. Ballantyne; Sgt. J. B. Bell; Sgt. V. S. J. Belt; Sgt. M. Benjamin; Sgt. J. C. Berry; W/O. J. M. Bingham; Sgt. L. W. Brierley; Sgt. J. Brining; P/O. J. A. Brooks; Sgt. L. A. Broomfield; F/O. D. D. G. Bryden; Sgt. D. H. F. Burton; Sgt. R. Burton; P/O. S. Campbell; F/O. R. Cave; Flt. Sgt. R. W. Cheetham; Flt. Sgt. A. W. Clarke; Sgt. V. W. Clarke; Sgt. H. C. A. Clements; F/O. D. C. Cooke; Sgt. D. A. Cotter; Sgt. J. J. Coyle; Sgt. R. A. G. Cranefield; Sgt. P. Crozier; Sgt. A. H. Davies; Sgt. J. Davison; Sgt. F. Dobbie; Sgt. J. M. Dobson; Sgt. P. Donnelly; Act. F/O. C. R. Faulkner; Sgt. R. A. Fisher; F/O. D. A. Foster; F/O. K. B. Freer; Sgt. P. Froud; Sgt. A. Furnival; Sgt. H. Gee; Flt. Lt. P. C. Granger; Sgt. D. Greenley; Sgt. J. F. C. Halliwell; P/O. D. A. C. Hamilton; Sgt. W. H. Harper; Sgt. F. Harrison; Sgt. J. D. Haywood; F/O. H. E. H. Healas; Sgt. H. Hemingway; Flt. Sgt. R. E. C. Hossack; Sgt. H. W. F. Howe; Flt. Sgt. D. J. Ives; Flt. Sgt. A. G. Johnston; Flt. Lt. E. R. Jones; Sgt. M. N. Jones; F/O. J. A. Kennedy, D.F.C.; Flt. Sgt. A. J. Kimberley; F/O. H. A. King; Sgt. G. L. Lawrie; Flt. Lt. D. S. Lord, D.F.C.; F/O. J. A. W. McCallum, D.F.C.; P/O. J. R. MacGregor; Flt. Sgt. J. S. Macnee; Flt. Sgt. J. S. Manley; F/O. K. Marlow; Sgt. W. H. Meager; F/O. R. E. H. Medhurst; F/O. A. N. Mercer; Sgt. R. C. M. Meyer; Flt. Lt. A. Millar; Sgt. N. Mitchell; Flt. Sgt. W. R. Morrell; Sgt. T. Morris; Sgt. J. Murgatroyd; Flt. Sgt. F. A. Murphy; Sgt. J. C. Murphy; Sgt. N. F. Nash; Sgt. E. Neville; Sgt. F. J. Noyes; Sgt. E. W. Oliver; F/O. E. W. Osborne; Act. F/O. J. E. P. Oxborrow; F/O. J. F. Parry; Sgt. D. Penton; P/O. A. L. Perrett; Flt. Sgt. R. C. G. Phillips; Sgt. E. W. Pitty; F/O. A. J. Quin; Sgt. R. C. Quinn; Sgt. R. W. Randall; Act. Sqn. Ldr. A. W. Raw, D.F.C., A.F.C..; Act. Flt. Lt. C. W. Reeves; F/O. D. F. Richer; Sgt. T. R. Riley; F/O. J. H. Rosbottom; F/O. G. F. Rose; Flt. Sgt. J. Singer; Act. Sqn. Ldr. R. A. Squibbs; W/O. L. K. Staines; Flt. Sgt. T. Starkie; Flt. Sgt. R. Tams; Flt. Sgt. I. S. Tawse; Flt. Sgt. W. Taylor; P/O. G. R. Thomas; Sgt. P. J. Thompson; Flt. Sgt. W. H. Thompson; Act. Sqn. Ldr. G. A. R. Undrell; Flt. Sgt. N. Warwick; Act. F/O. E. Westgate; W/O. B. C. Wicks; W/O. C. A. Winch.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—L.A/C. H. B. Jones.

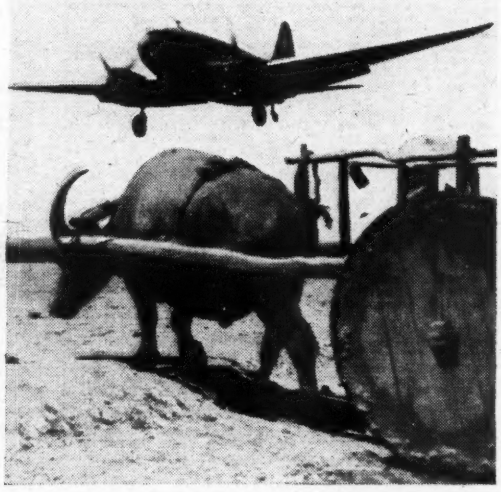
KILLED ON ACTIVE SERVICE.—W/O. P. F. F. Arthur; Sgt. J. H. Brierley; P/O. C. Campbell; Flt. Sgt. R. A. Davies; Flt. Sgt. N. Dixon; Sgt. J. H. W. Durrant; F/O. I. A. Graham; P/O. R. A. Green; W/O. E. Heathcote; Sgt. T. A. Hemingway; Sgt. K. F. Hewitt; Flt. Lt. J. A. Jayes; F/O. H. Jones; Sqn. Ldr. H. V. L'Amy; Sgt. N. R. Luker; P/O. S. C. Mallinder; Sgt. W. H. Maynard; P/O. P. D. Musto; Flt. Lt. J. L. Parkin; Sgt. J. Phillips; Sgt. J. Retallick; Sgt. J. E. Robinson; Flt. Sgt. G. L. Smith; L.A/C. N. Stott; Flt. Sgt. G. F. Taylor; F/O. L. Thompson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. R. A. Andrews; Sgt. J. Johnston; Flt. Sgt. D. H. McRae; Flt. Sgt. L. C. Miller; Sgt. K. Talbot; Sgt. G. E. Apps; F/O. R. H. J. Fernandes; F/O. R. Gibson; F/O. T. Guthrie; Flt. Sgt. J. C. Hamer; Flt. Lt. J. K. A. Simpson.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Cpl. R. H. Gane; F/O. J. S. Gillespie.

DIED ON ACTIVE SERVICE.—L.A/C. J. Aiken; A/C.1 J. R. Andrews; Cpl. C. G. Baker; L.A/C. L. Beddows; L.A/C. E. J. Blaskett; Flt. Sgt. A. Bullock; A/C.2 C. S. Coucill; Sgt. J. McD. Davidson; L.A/C. A. Dawson; Sgt. L. Enmington; Sgt. L. A. Gibbs; A/C.1 G. C. E. Hodges; L.A/C. R. P. Hufton; L.A/C. J. Hydes; Sgt. A. O. Jones; A/C.2 J. Leitch; L.A/C. J. Y. Low; Cpl. W. McKittrick; L.A/C. T. H. Mason; A/C.1 A. F. Murray; L.A/C. R. Nancarrow; A/C.2 F. Peters; Cpl. E. G. Rivers; Act. Sqn. Ldr. C. L. Smith; L.A/C. F. J. Swatton; L.A/C. M. E. Trevor; L.A/C. W. E. Turner.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. K. A. Attwood; Flt. Sgt. J. C. Cash; Flt. Sgt. J. C. Charnock; Sgt. W. G. Clapp; Sgt. G. K. Hardwick; Sgt. D. W. Stead.



ANCIENT AND MODERN: A strange contrast is seen on a Chinese airfield, where a Curtiss Commando comes in to land, over a water buffalo pulling a primitive cart.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/CW.1 L. Linett.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. F. G. Barrett-Lennard.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. J. F. Moore.

WOUNDED OR INJURED IN ACTION.—W/O. S. S. Seymour.

MISSING, BELIEVED KILLED IN ACTION.—Act. F/O. K. Grose; F/O. J. R. R. Preston.

MISSING.—W/O. T. L. Awcock; W/O. C. D. Bell; P/O. M. H. Bell; Flt. Sgt. M. B. Blaubaum; F/O. I. P. Hourigan; Flt. Sgt. H. J. Conquest; P/O. E. N. Devine; Flt. Sgt. R. K. Emrose; Flt. Sgt. G. R. Ferguson; Act. F/O. D. S. Lade; P/O. R. H. Leonard; Flt. Sgt. K. A. Martin; F/O. H. P. Moylan; P/O. A. W. M. Parsons; F/O. G. P. Roberts; F/O. W. J. Woods.

KILLED ON ACTIVE SERVICE.—P/O. V. Abel; F/O. E. C. Buckland; Flt. Sgt. R. A. Corbett; Flt. Sgt. D. Fletcher; Flt. Sgt. D. R. McDonald; Flt. Sgt. T. D. Potter; P/O. J. M. Ruglen; Flt. Sgt. L. D. Southwood; F/O. W. C. Tufnell; Flt. Lt. P. E. Willoughby.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. F. F. Stokes.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. C. T. Griffiths.

DIED ON ACTIVE SERVICE.—P/O. G. H. Blom; Flt. Sgt. H. H. McAteer.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. H. J. Hurley; Flt. Sgt. J. A. W. McKenzie; Flt. Sgt. J. D. Newcombe; F/O. D. L. Pickard.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. L. P. Archibald; F/O. I. Armitage; F/O. M. R. Cantin; Sgt. A. M. Grimson; Flt. Sgt. M. J. Kennedy; P/O. J. L. R. R. Lachance; P/O. N. B. Morrison; F/O. L. R. Rinn; W/O. R. E. Roos; Flt. Sgt. S. E. Smith.

WOUNDED OR INJURED IN ACTION.—W/O. F. L. Bertram; F/O. T. G. Kernaghan.

MISSING, BELIEVED KILLED IN ACTION.—W/O. L. J. Baxter; Flt. Lt. C. R. Symons.

MISSING.—Flt. Sgt. D. McM. Boyd; F/O. W. R. Breithaupt, D.F.C.; F/O. E. J. Brian; P/O. D. N. Carter; Flt. Sgt. R. A. Crowell; W/O. L. G. Evans; W/O. D. E. Gapp; F/O. R. B. Gowan; Flt. Sgt. J. H. Ireland; Flt. Lt. R. D. McLeod; F/O. A. G. Mathews; P/O. J. J. Milne; P/O. W. L. Moxley; Flt. Sgt. G. H. Noble; P/O. J. E. O'Brien; F/O. J. M. Parkinson; Sgt. G. S. Perry; Sgt. V. Sobeski; Sgt. A. M. Vanderhart.

KILLED ON ACTIVE SERVICE.—Sgt. E. G. Barrie; F/O. G. D. W. Burnie; Sgt. R. H. Moorcroft; Flt. Sgt. J. D. Morrison; Sgt. C. R. Osborne.

DIED ON ACTIVE SERVICE.—Sgt. R. R. Newall.

Royal New Zealand Air Force

KILLED IN ACTION.—Flt. Lt. D. P. Perrin, D.F.C.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. A. B. Sheddan.

MISSING.—W/O. W. G. Abbott; P/O. R. G. Collender; Flt. Sgt. B. W. Ellison; Act F/O. L. Fulker; Flt. Sgt. N. A. Good; P/O. G. R. Newey; Act. F/O. R. J. Odgers; Flt. Sgt. K. V. Stafford.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. N. W. Hawkins.

South African Air Force

KILLED IN ACTION.—2/Lt. R. J. Rowe.

MISSING.—Lt. P. W. Bennee; Capt. J. W. Capstick; Lt. R. W. E. Kingwell; Capt. D. A. S. Nairn; W/O. V. L. Robilliard; 2/Lt. S. Stotesbury; W/O. M. C. Wiese.

KILLED ON ACTIVE SERVICE.—Lt. R. O. Hesketh; Maj. W. R. Rhodes.

DIED ON ACTIVE SERVICE.—Air Mech. R. A. Andrews; W/O. L. L. Botha; Lt. F. W. Bradl; Act Cpl. J. Cheesman; Air Mech. R. J. Drane; Act. Cpl. W. E. Kimbrey; Air Mech. D. R. Maeder; Air Mech. W. E. Viret.

Indian Air Force

KILLED ON ACTIVE SERVICE.—P/O. R. S. Sandhu.